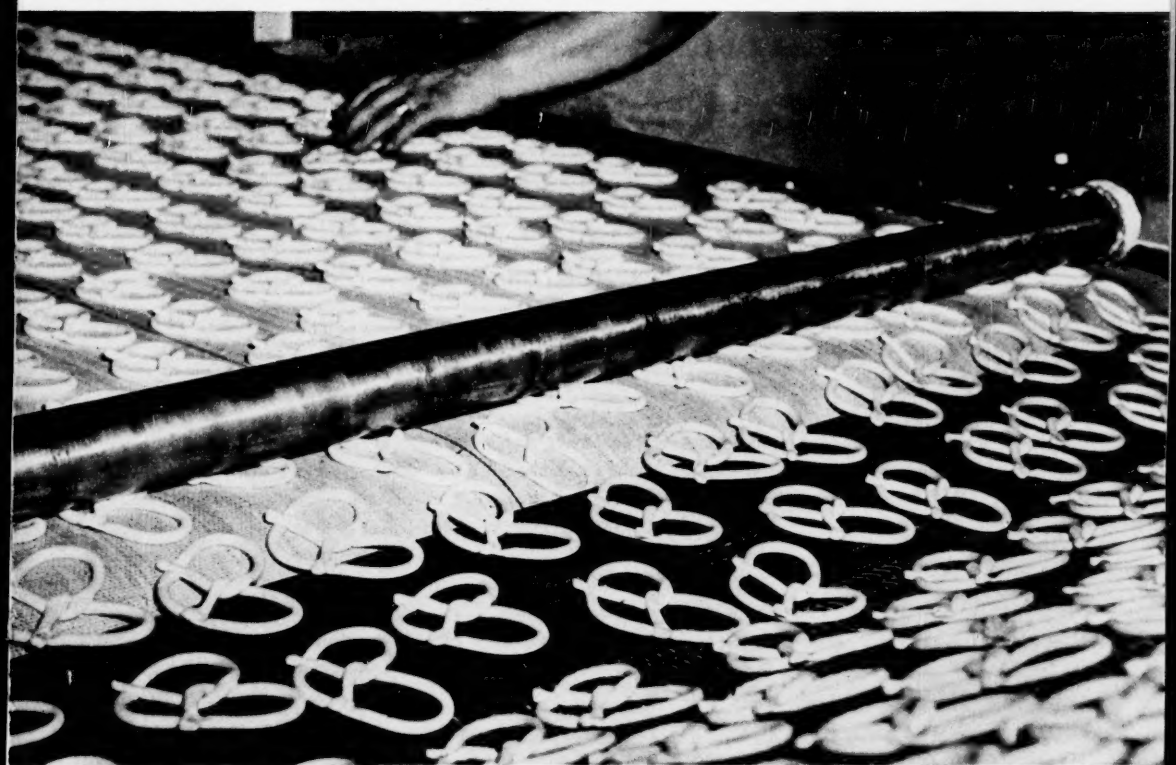
NATIONAL EDITION

Food Industries

For those who control quality and costs through management and production—a McGraw-Hill publication



Pick-off rolls gently transfer pretzels from conveyor to conveyor at Halter's Pretzels, Canton, Ohio. (Story inside)

AUGUST, 1949: The world food problem, Wet milling advances 100 years in 10, Metallizing for maintenance, IFT highlights, Special report

SAVE WITH LIQUID SUGAR!

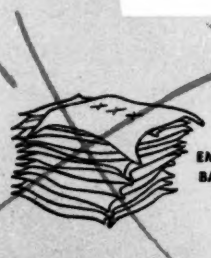
No!

MANUAL UNLOADING

WASTED SPACE

REHANDLING, DUMPING AND FILTERING

BOOKKEEPING



EMPTY BAGS

Easier and cleaner to use
Eliminates costly handling
Increases production efficiency

Liquid sugar eliminates the heavy cost of unloading, storing and opening sugar bags . . dumping sugar into kettles . . dissolving . . . filtering . . . and the constant expense of bag handling and returning. Liquid sugar enables one man to do the work of five . or more.

Liquid sugar is cleaner, more efficient. It is metered into your processes, easily and precisely—by the turn of a valve. It gives you continuous, automatic control—a streamlined sugar supply. Using liquid sugar may also help you to convert to continuous production methods, at great savings over batch methods.

To switch from dry to liquid sugar requires only the installation of storage tanks and piping, the cost of which is quickly returned by savings in labor and increased efficiency.

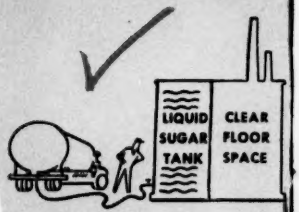
NOW, FOR THE FIRST TIME, LIQUID SUGAR CAN BE AVAILABLE ANYWHERE!

Cyanamid's new process, based on ion exchange, makes it possible for you to produce liquid sugar right in your own plant . . . or have it delivered at your plant door from a local refinery. It produces from raw sugar a refined liquid sugar equal in odor, color and taste to refined white sugar dissolved in water—and better in ash content. This process is highly adaptable—it also produces less highly refined liquids, according to your needs, at an economical cost.

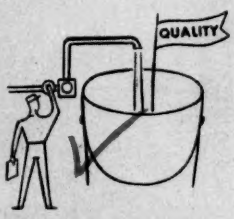
IF YOU ARE A LARGE USER, requiring 20-30 or more tons a day, it may pay you to produce liquid sugar in your own plant.

IF YOU ARE A SMALLER USER, you can combine with others in your area to produce your needs. Or you may find that there is already an independent ion exchange liquid sugar plant in your area. Whatever your needs, fill out the coupon below for more complete information.

Yes!



AUTOMATIC DELIVERY



AUTOMATIC HANDLING

SAVINGS

AMERICAN Cyanamid COMPANY

ION EXCHANGE PRODUCTS DEPARTMENT • 30 Rockefeller Plaza, New York 20, N. Y. F8

☐ Is liquid sugar produced by ion exchange available in our area? From whom?

☐ We are interested in making liquid sugar in our own plant, and would like a rough estimate of initial cost and operating cost . . . and the savings we can expect to effect. Use ___ tons per day (working day of ___ hrs.) for estimate

*Name*_____

*Company*_____

*Street*_____ *City*_____ *State*_____

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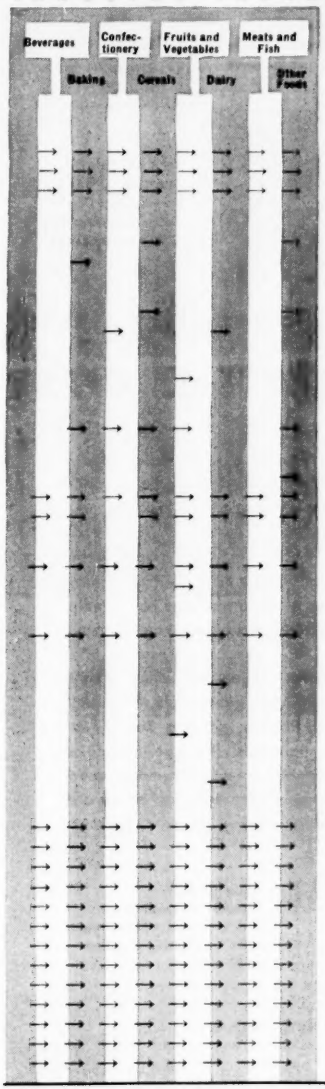

Food Industries

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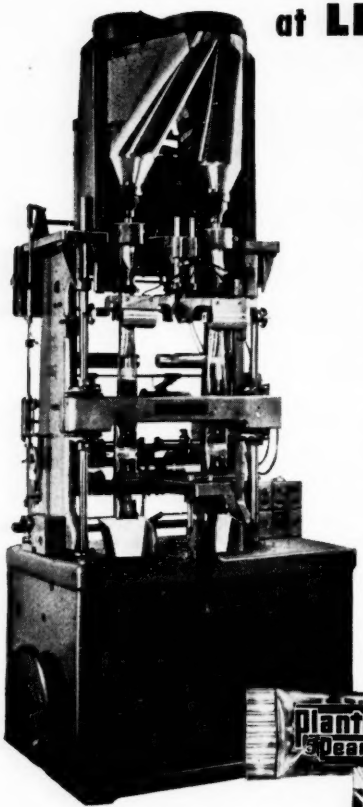
THIS READY-MADE BAG, HAND-FILLED
Approximate Cost
Labor and Materials
$7.00 per thousand

THIS *AUTOMATIC* TRANSWRAP PACKAGE
Approximate Cost
Labor and Materials
$3.29 per thousand

AUTOMATICALLY produces a better-selling package at LESS than HALF THE COST



TRANSWRAP—industry's most practical and efficient packaging machine—forms, fills, seals and delivers a better-looking, better-selling package for your product. . . completely automatically.

In cost, the *finished filled* TRANSWRAP units actually run less than half the price of ready-made *empty* bags for manual processing. And, because a single operator can handle a whole battery of TRANSWRAP machines, wage savings are phenomenal.

TRANSWRAP is equally efficient for powders, solids, tablets and even liquids. Standard packaging materials which may be used include cellophane, Pliofilm, glassine, roll foil or other suitable heat-sealing materials. Package capacities range up to 80 cubic inches in volume and often may exceed one pound in weight. Custom-engineered adaptations are possible to meet your individual requirements with maximum efficiency.

Model "B" Transwrap with auger feed. Also adaptable to Volumetric or liquid feed. Produces 40 to 75 pkgs. per minute.

Also Available—
Model "A" Transwrap
For small and unit packages. (2⅜" x 6" Max.) Speeds to 150 pkg/min.

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TRANSPARENT WRAP MACHINE CORPORATION

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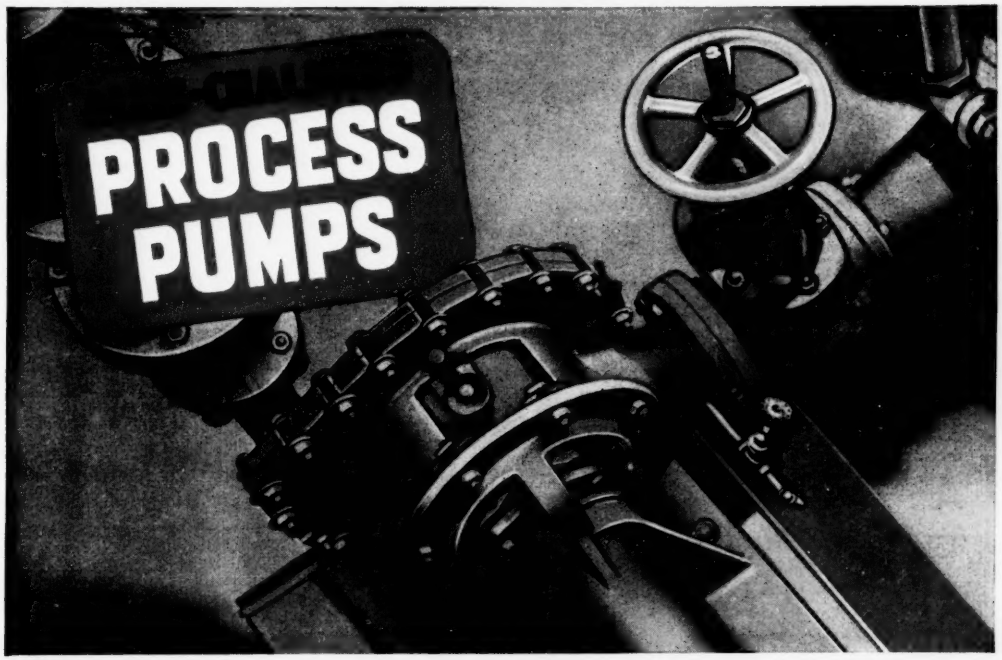

"No Replacement Parts Needed

ON ABRASIVE LIQUOR PUMP!"

SUPERINTENDENT of a midwestern processing plant says: "We pump tailings and filter solutions. Our conventional pumps required parts replacement every 6 to 10 weeks. We have *not replaced any parts* in our A-C process pumps *in 20 months*. We are replacing all our conventional pumps with A-C process pumps."

Plant after plant reports similar experiences. A-C process pumps are designed and built stronger especially to stand up under the added wear of suspended abrasives, mild corrosives or both. Such features as stuffing box on suction side . . . double volute casing . . . extra thick sections . . . closed impeller . . . separated wearing parts . . . and adjustable clearance between impeller and wearing plate give you added life and amazingly lower maintenance costs.

STOCKED IN 4 MATERIALS

Shipment from stock on complete pumps and all parts in aluminum-bronze, Ni-resist, 18% chrome steel and 316 stainless steel. You need not carry spare parts inventory. For complete information, see your A-C Authorized Dealer or Sales Office or write for Bulletin 08B6615. A-2737

ALLIS-CHALMERS, 1113A SO. 70 ST.
MILWAUKEE, WIS.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

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MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

ALLIS-CHALMERS

1 **1770**—Improvement of livestock by selective breeding boosted milk output . . . encouraged dairy farming. City folk now began to sample this wonderful beverage. But harmful bacteria in milk caused sickness, spread disease.

2 **1864**—France's Louis Pasteur won world acclaim by discovering how to rid milk of impurities. Milk soon became an important source of food. Vitally needed was electrical horsepower to speed it from farm to consumer.

3 **1915**—The year Howell Electric Motors arrived also marked the widespread use of the automatic rotary bottle filler and capper in the dairy industry. Soon, these rugged, industrial type motors were widely sought in many industries.

MILK . . . 58 BILLION QUARTS ANNUALLY!

4 **Today**—Pure, wholesome milk and milk products speed from cow to consumer at the rate of 58 billion quarts a year. Automatic, electrically driven machines—like the milk pump shown here, equipped with a Howell Sanitary Motor—have upped milk output, cut costs, saved time, and helped to make milk and its by-products a 10-billion-dollar-a-year business.

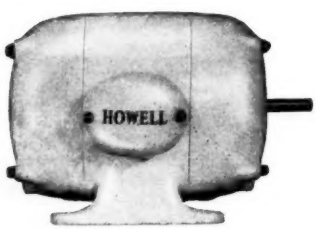
You'll also find precision-built Howell Motors driving separators, clarifiers, churns, fillers, conveyors, pumps and cleaning apparatus in the dairy industry.

If you require motors in your business to operate under the most gruelling conditions . . . motors built specially for industrial use . . . consult HOWELL!

Free enterprise encourages mass production, supplies more jobs — provides more goods for more people at less cost.

SANITARY MOTOR

For dairy and food processing industries. Complies with latest 3-A Sanitary Specifications.



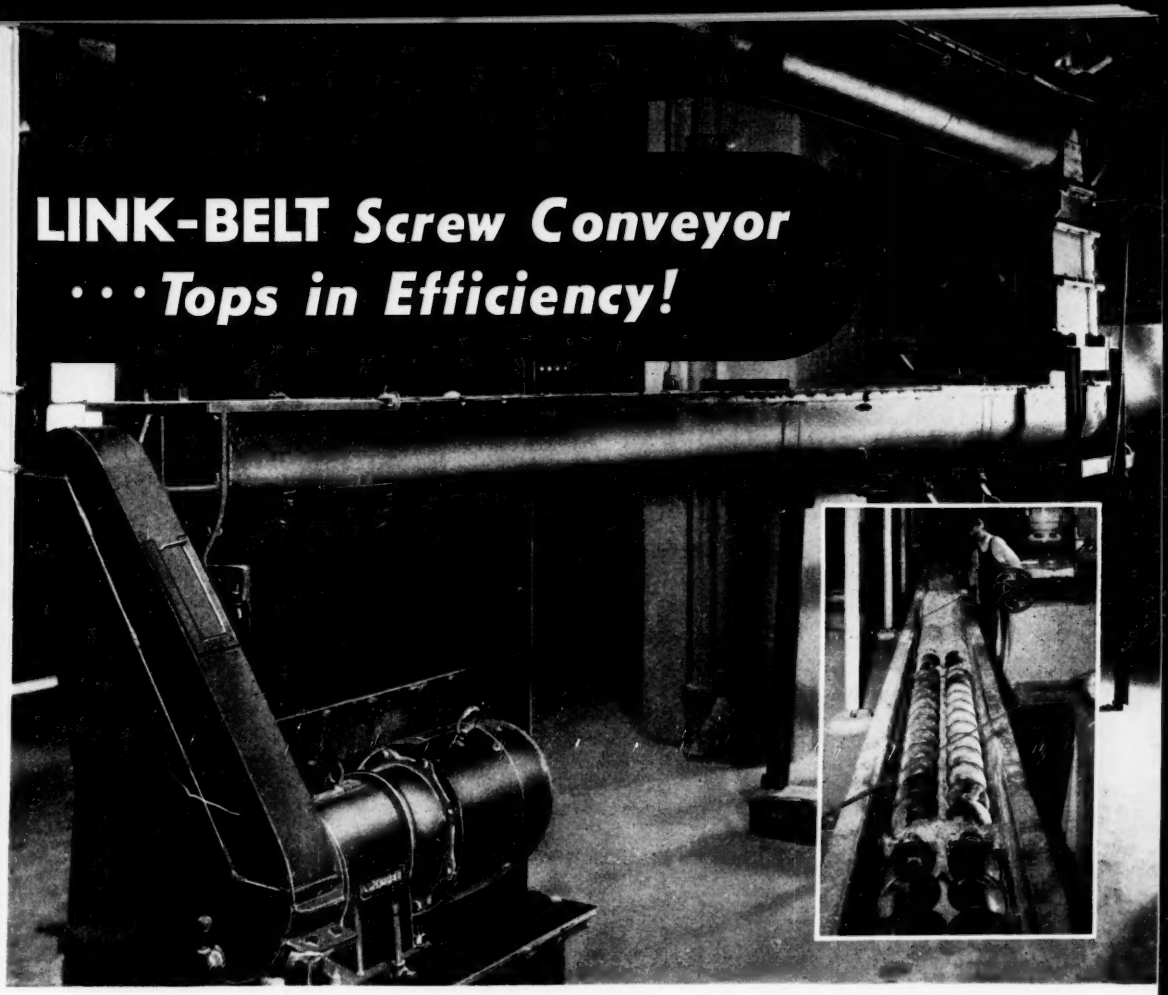
HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built Industrial Motors Since 1915

HOWELL Red Band MOTORS

LINK-BELT *Screw Conveyor*
· · · Tops in Efficiency!



Bulk materials handling reduced to its simplest terms is represented by Link-Belt screw conveyor. Applicable to a wide variety of handling jobs it is the preferred method in thousands of plants in greatly diversified industries. Simple in construction, with a minimum number of moving parts, it is easy to install, economical to operate, requires negligible attention or upkeep.

Compact, it occupies less space than other types of conveyors; has no return run.

Dust-tight, it protects contents against waste or contamination.

Adaptable, it operates at any angle, and will perform mixing, blending or feeding operations with elevating, lowering or horizontal conveying. Note inset photograph showing parallel flights of opposite hands, in common trough.

Link-Belt Company originated and is the largest producer of Helicoid continuous rolled conveyor flighting. Link-Belt screw conveyor is also made in sectional form, in a wide range of diameters, gauges and pitches, and in various metals.

Link-Belt engineers invite your request for information or assistance in planning efficient low-cost screw conveyor installations. Contact our nearest office.

11.540

TYPES OF LINK-BELT CONVEYING MACHINERY

Belt Conveyors	Apron Conveyors
Screw Conveyors	Oscillating Conveyors
Bulk-Flo Conveyors	Flight Conveyors
Chain Conveyors	Bucket Elevators
Trolley Conveyors	Bucket Carriers

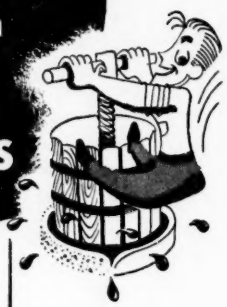
LINK-BELT COMPANY Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 3, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

LINK-BELT

CONVEYING MACHINERY

"THE COMPLETE LINE"

How Fruit Pressers Save Pressing Time . . . increase juice yields with CELITE Pressing Aids

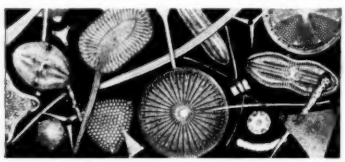


Here is an easy, low-cost way to increase your juice yields, cut down pressing time and save wear and tear on your equipment.

Simply add a small amount of a Celite Pressing Aid to the pulp before pressing.

It works like this:

Celite Pressing Aids are diatomaceous silica powders. The tiny Celite particles, open and porous in structure, interpose themselves between the particles of solid pulp matter, opening up countless channels through which the juice escapes—freely and at lower pressure. More juice is thus extracted in less time. Press slippage is also eliminated, the drier cake is more easily removed and the cloths may often be replaced without the need for washing.



Photomicrograph showing a few of the many varied shapes which make up a Celite Pressing Aid. These minute particles form countless channels for the juice to escape.

Celite Pressing Aids are being successfully used in the pressing of practically all types of fruit products. They require no special equipment. And the saving in pressing time, together with the increase in juice yield and the saving on cloths and other equipment which results from their use generally more than pays for the cost of the small amount of Pressing Aid required.

For further information on Celite Pressing Aids, write Johns-Manville, Box 290, New York 16, N. Y.

WHAT USERS FIND

$3 Bag of Celite Pressing Aid Returns $57.40 Profit

(reported by J-M Engineer H. G. Martin)

Recently, one of my customers asked if we could increase his grape pressing yield.

I added one pound of a Celite Pressing Aid (about ½% by weight of grapes) and stirred it throughout the mass. The mixture was then placed in cheese racks under the hydraulic press.

Previously, the pressing operation had taken 16 minutes. With Celite, the press closed completely, producing a dry cake in nine minutes. Instead of requiring a total pressure of 1100 lbs. psi the press was finished at 600 lbs. psi. There was no slippage of the frames, the cloths cleaned better, and there was no breakage of cloths. In addition to this, the final yield of juice was so much greater that each $3.00 bag of Celite used resulted in an overall profit of $57.40.

One Hydraulic Press Load Convinces Jelly Maker

(reported by J-M Engineer T. A. Feuss)

When I attempted to sell a Celite Pressing Aid to this jelly manufacturer, the thought of putting a filter powder in his fruit to get more juice quicker seemed ridiculous to him.

However, a run was made, adding 1½% Celite to the guavas at the cookers. Observers remarked that they had never seen the press close so rapidly or so far. On emptying the press, the cheeses were quite dry and one laborer could remove them from the cloths because they sheared off by gravity. No cloths or lattices were broken, the juice was noticeably free from suspended mud and the cloths were replaced in the press without washing.

Sales Appeal Improved with Celite

(reported by J-M Engineer W. A. Reschke)

A trial run convinced this customer that he had much to gain by using Celite Pressing Aids in making jelly from frozen grapes.

The equipment used was a vertical hydraulic press. Without Celite, the centrifuges had to be cleaned 3 times a day. With Celite, they required cleaning only once a day. The customer also noted that the cloths were in better condition after pressing with Celite. Production of juice remained about the same, but the jelly was much clearer—it had better sales appeal—and judging from its appearance, a considerably longer storage life could be expected.

These advantages were obtained by the addition of 20 pounds of Celite to each 900-lb. batch of grapes pressed.

Celite Makes Apple Pressing Easier

(reported by J-M Engineer F. D. Richards)

During my first call on this customer, I recommended the use of 2% of a Celite Pressing Aid in their apple pulper.

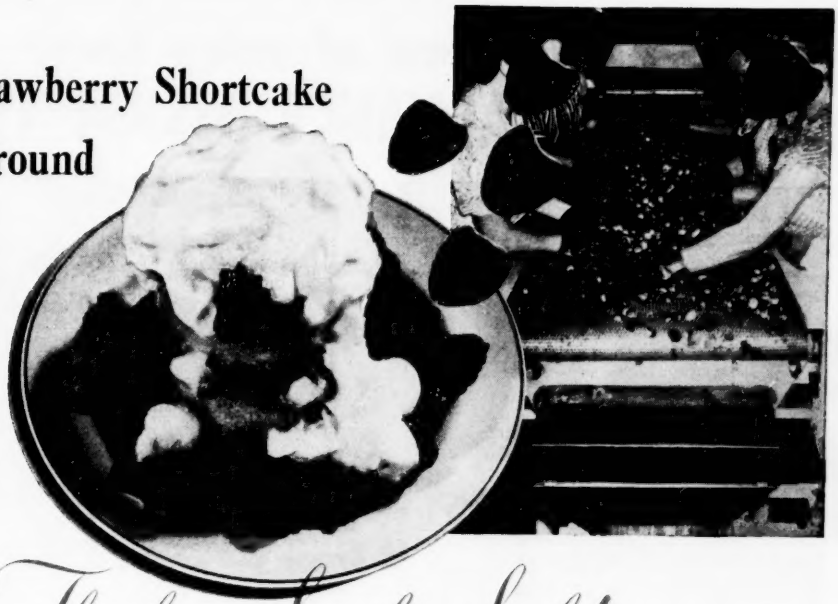
Recently, when I called again, he informed me of the results. Ordinarily, with the kind of apple they are using at present, the press cake is squashy and slippery. With Celite, the cake is much firmer and they are able to operate the press at a higher pressure. This, according to their estimate, has increased the juice yield by approximately 5%.

Johns-Manville JM PRODUCTS

Celite Pressing Aids

Reg. U. S. Pat. Off.

Real Strawberry Shortcake all year 'round



— Thanks to Stainless Steel!

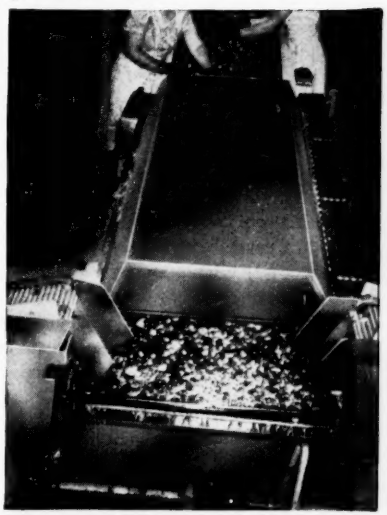
MONTH AFTER MONTH, frozen strawberries outsell almost every other frozen fruit in America's markets. Their fresh-picked flavor and natural appetizing color now delight millions *every* week in the year.

Keeping the flavor of frozen strawberries fresh and their color bright is an important job for Stainless Steel. Washers, conveyors, cutters and mixing drums that are made of Stainless can't possibly corrode . . . can't possibly impart an off-taste or off-color to the berries.

Important as this feature is, it's only one of many advantages of Stainless equipment in processing fruits and vegetables. Stainless Steel is so easy to clean and to *keep* clean that you can operate it with the fewest possible interruptions. And Stainless is so tough and so strong that it withstands heat, cold, wear, abrasion and other abuse far better than other metals.

When you're thinking in terms of new processing equipment, think in terms of Stainless Steel. And for the best possible results—U·S·S Stainless Steel. This service-tested, service-perfected Stainless is so uniform in composition, in finish and fabricating qualities that it assures the utmost in performance.

You'll be interested in the booklet, "An Introduction to Stainless Steel." For your copy, write to United States Steel Subsidiaries, 2097 Carnegie Building, Pittsburgh 30, Pa.



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We *know* you will chalk up real savings with Buflovak . . . a type Evaporator available for every industrial requirement. Buflovak Equipment includes Dryers, Solvent Recovery Equipment and Processing Equipment. We shall gladly send full information on request.

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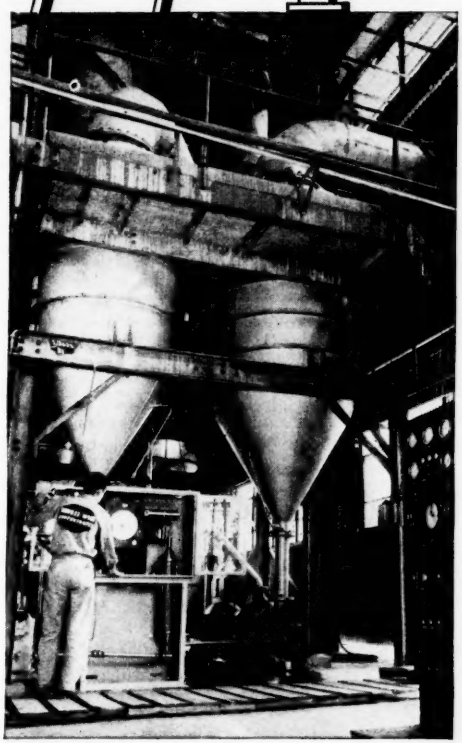


"Minute Maid" Fresh Frozen Orange Juice Concentrate of high quality is produced by the Vacuum Foods Corporation in this Buflovak Low Temperature Evaporator.

BUFLOVAK EQUIPMENT

Division of Blaw-Knox Co.

1631 FILLMORE AVE.
BUFFALO 11, N. Y.

Do you measure salt by RULE OF THUMB?

For Accurate Salt Measurement "PASS the SALT" by LIXATOR*

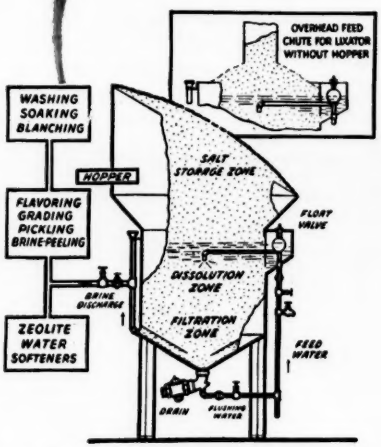
RULE of thumb measurement of salt by volume, in bucket or shovel, or by weight is inaccurate and wasteful.

For example, in measurement by dry salt volume, one cubic foot of dry salt will weigh *anywhere* from 66 to 84.5 pounds. And measurement by dry salt weight is "guesswork," too, for salt may contain from .05% to 5.0% moisture depending upon humidity, length of time in storage, varying bulk and area of the stock pile.

BUT... with the Lixate Process salt measurement is *exact*. Each gallon of Lixate Brine *always* contains *exactly* 2.65 pounds of Sterling Rock Salt. For the Lixator *automatically* makes 100% saturated, crystal-clear, self-filtered brine, that meets the most exacting chemical and bacterial standards. And this brine can be *easily* and *accurately* diluted volumetrically to any desired strength.

Because of this, accurately measured Lixate Brine is widely used in food processing...in the "flotation" method of grading small vegetables and grains with salt brine of *known* specific gravity. Lixate Brine is also used to flavor foods...to wash and preserve vegetables and fruits before processing.

Consult our Technical Service Department on your use of salt and brine. The experienced men on this staff will advise you on the proper location for Lixator and salt storage, pumping arrangements, types of pumps, meters, and valves. They will fit the *money-saving* Lixator into your plant operations. Write today!



HOW THE LIXATOR WORKS—*In the dissolution zone*—Flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. *In the filtration zone*—Through use of the self-filtration principle *originated by International*, the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

NOW AVAILABLE
The New Stainless Steel STERLING* MODEL LIXATOR*
For "Lifetime" Use
For Greater Economy
For Added Cleanliness

*Trade Mark

The **LIXATE** *Process*
REG. U.S. PAT. OFF.
for making brine
INTERNATIONAL SALT COMPANY, INC.
Scranton, Pa.

Specify Thermoid

The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tight, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

Versicon Hose Cuts Costs

Now available . . . a multi-purpose hose designed for superior performance with virtually any liquid or gas . . . Thermoid Versicon Hose. It is made with neoprene tube and oil-resistant cover—with high tensile rayon cords to insure maximum strength, light-weight and flexibility.

Versicon, another of the famous quality rubber products made available to industry through Thermoid research, is the answer to a long felt need. Now your nearest Thermoid distributors can supply you with *one hose* for your requirements. Now you can cut your costs and reduce inventory. Versicon eliminates the need for special hose . . . Versicon *is* the special hose. Available from 3/16" to 2½" for use with air, water, oil, gases and virtually all fluids in lengths from 50′ to 500′ depending on size.

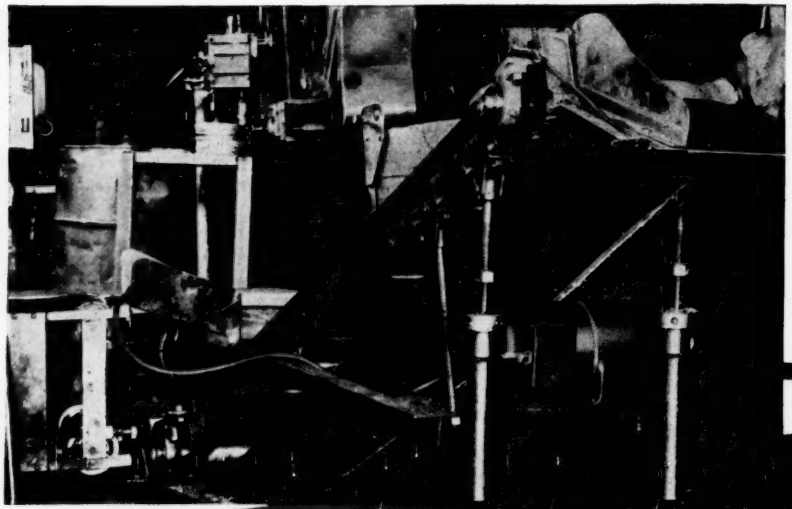
It will pay you to ***Specify*** Thermoid!

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

Thermoid Company

Main Offices and Factory • Trenton, N. J., U. S. A.
Western Offices and Factory • Nephi, Utah, U.S.A.
Industrial Rubber Products • Friction Materials • Oil Field Products

For Top Performance . . . Long Service



Century ¼ horsepower squirrel cage, gear motor driving a conveyor.

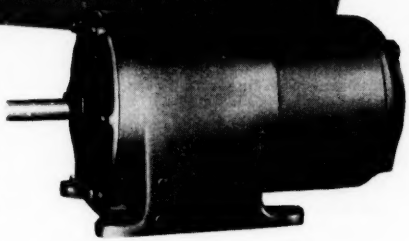
Match the Speed and Power Requirements of Your Conveyors With Century GEAR MOTORS

The conveyor shown here is driven by a Century Gear Motor which provides the correct power and speed to handle the output of a punch press.

Century Gear Motors are available in sizes from 1/6 to 1½ horsepower to provide many combinations of power and speed. The right combination on your materials handling equipment will help to coordinate your production, reduce handling costs and increase efficiency.

Century Gear Motors are engineered to maintain the high torque slow speed shaft in rigid alignment. Mounting feet are an integral part of the rugged, compact gear housing—providing a strong rigid unit.

Specify Century Gear Motors for all your slow speed requirements.



Popular types and standard ratings are generally available from factory and branch office stocks.

Century C MOTORS

-637

CENTURY ELECTRIC CO. 1806 Pine Street • St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

BACK OF TODAY'S

Best dressed salads

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GOLDEN BRAND
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BEST FOODS
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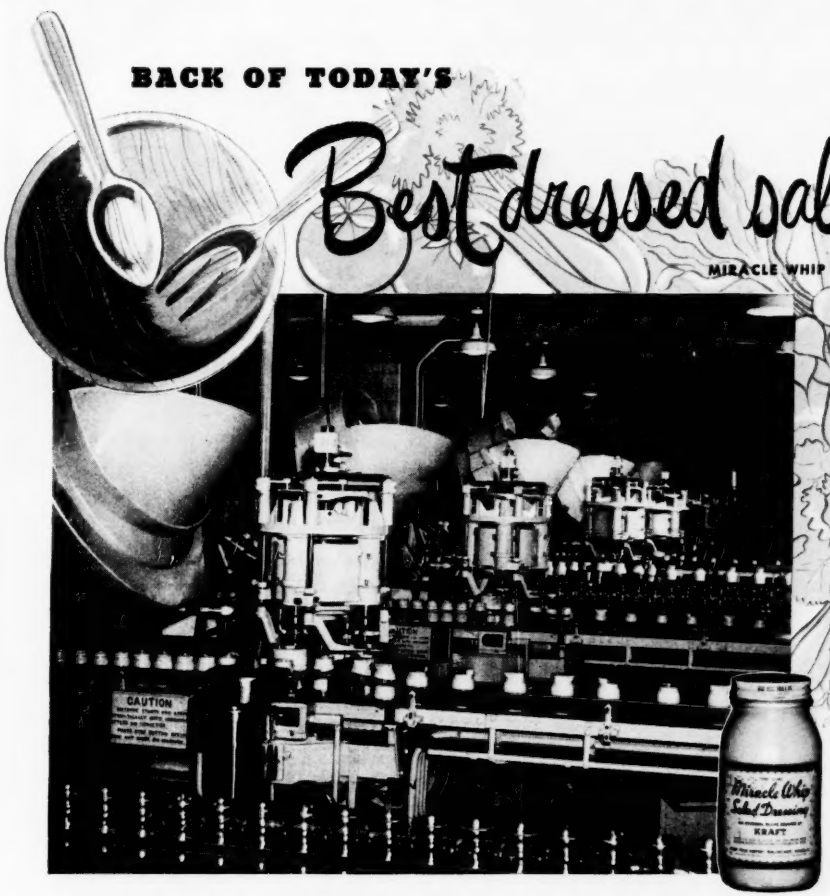
TANG
LAURA SCUDDER



Battery of Pneumatic 4 Head Rotary Cappers in operation at Chicago plant of Kraft Foods Company.

YOU'LL FIND PNEUMATIC MACHINES

When it comes to mayonnaise and other salad dressings, Pneumatic is very much in the picture. Look at the brand names of the companies making products of this type who use Pneumatic equipment for cleaning, filling, capping and labeling their containers. They are the pick of the crop—and they picked Pneumatic out of the field!

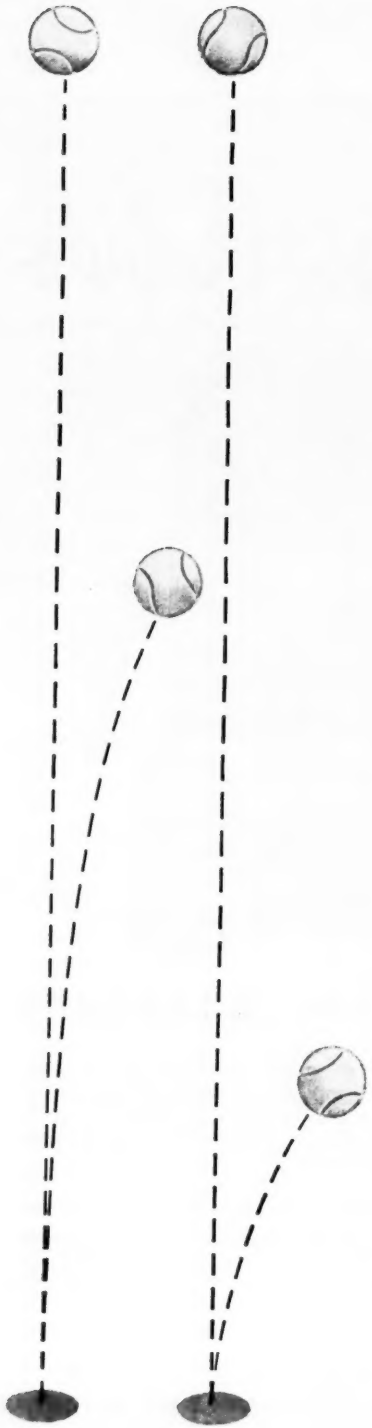
Favorites don't just happen—they are established for good reasons. Reasons such as Pneumatic's sturdier construction, more accurate machining and sounder basic design—all of which add up to smoother, speedier "lower cost per container" operation. Leading companies in every field of packaged and bottled products will tell you—you'll save money in the future if you buy Pneumatic equipment now.

★ ★ ★

PNEUMATIC SCALE CORPORATION, LTD., 91 Newport Avenue, North Quincy 71, Massachusetts. Branch Offices in New York, New York; San Francisco, California; Chicago, Illinois; Los Angeles, California; Seattle, Washington.

PNEUMATIC

PACKAGING AND BOTTLING MACHINERY



Getting "more bounce" into your business

Some 15 years ago a simple packaging trick put more bounce into tennis balls.

The trick—putting them in a key-opening can under pressure—pleased everybody.

Inventories could be built up in slack seasons without fear that the tennis balls would go stale.

Shelf and window displays could be made in sporting goods stores easily.

Players had tennis balls with more bounce . . . any time . . . any place.

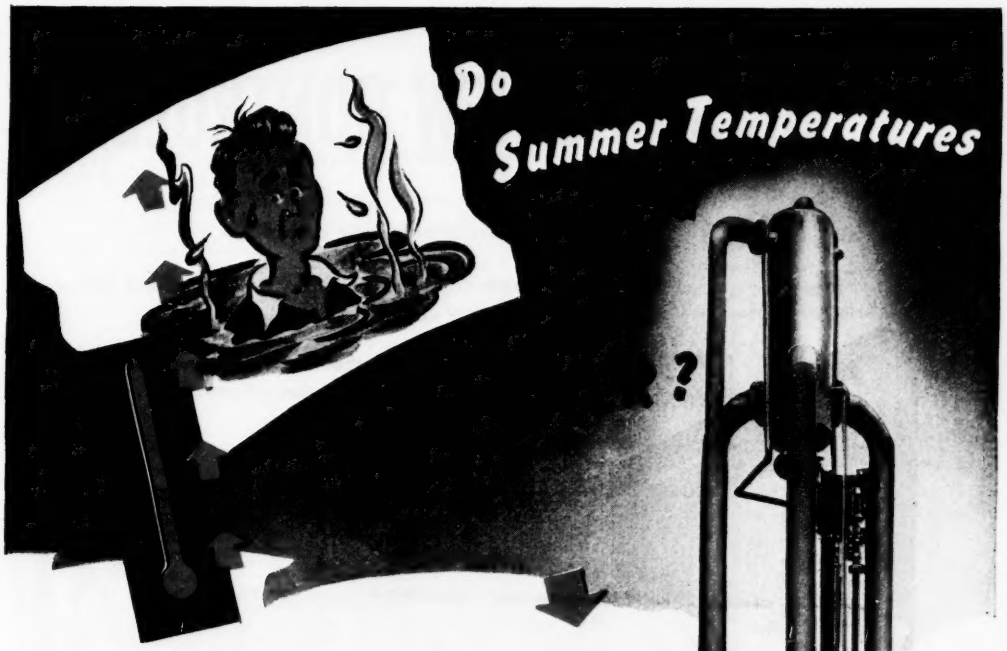
Perhaps similar expert packaging advice on the part of American Can Company will get "more bounce" into your product.

Canco know-how in devising new and better packaging methods has paid off in extra profits for others for 48 years. Maybe it can do the same for you.

AMERICAN CAN COMPANY

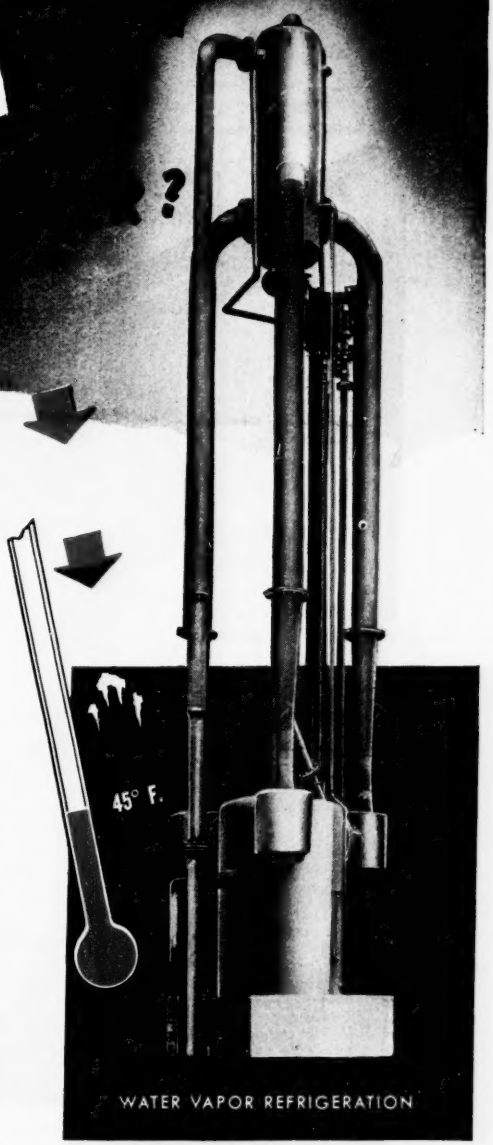
New York · Chicago · San Francisco

CALL CANCO FIRST



We actually mean water, for when hot summer days come along, the problem of securing large quantities of chilled water is a serious one in many industries . . . Especially if river or pond water is the main source of supply.

If you've been having trouble with your cooling water supply—if its not cold enough or if you need more of it—then you should investigate Ingersoll-Rand Water-Vapor Refrigeration.



HERE ARE A FEW IMPORTANT FEATURES:

20 to 1200 tons of refrigeration in a single unit.

Chilled water temperatures of approx. 45°F.

Water is the only refrigerant . . . there are no expensive, dangerous or toxic refrigerants to worry about.

There are no moving parts in the cooler itself. Cooling is obtained by direct evaporation of water in a high vacuum.

Units are entirely self supporting and can be installed out doors.

HERE'S HOW TO GET MORE INFORMATION:

First, ask the nearest Ingersoll-Rand Branch Office for a copy of bulletin No. 9143-A. If you would prefer to discuss your problem in detail, one of our engineers will be glad to call on you.

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COMPRESSORS
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LIFT YOUR PROCESSING TO A **NEW HIGH** IN ACCURACY

WITH BRISTOL'S NEW CONTROLLERS

1. **A new standard in automatic control . . .**
2. **A new opportunity to produce any desired control action with infallible accuracy . . .**
3. **A new degree of assurance that those actions will be produced or duplicated exactly by a simple dial adjustment . . .**

BRISTOL'S *Series 500 Air-Operated Controllers*
for temperature, pressure, flow, liquid level

These Features are NEW and EXCLUSIVE

WITH BRISTOL'S SERIES 500 CONTROLLERS

1 RESET, DERIVATIVE AND PROPORTIONAL TIME VALUES REPRODUCIBLE

Adjustments are accurately calibrated and exactly reproducible. Similar settings in any Series 500 Controller will produce *exactly the same* values.

This means that you can standardize controller adjustments for any given process throughout a plant or throughout a national organization. It also means you can replace controllers on a process with full assurance that such replacements will exactly duplicate the performance of the original.

No more cut-and-try to arrive at the original setting... saves hours by reducing shutdown time.

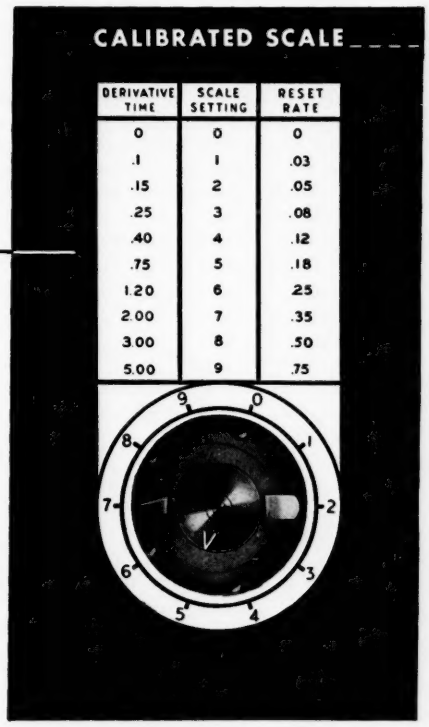
2 SIMPLEST CONTROL SYSTEM TO SERVICE

Only one service adjustment is needed. The control units and parts making up the control system are so accurately designed and tolerances are so closely controlled that the system can be completely disassembled and reassembled, even with replacement parts, with only one simple adjustment needed to put the system in exact calibration.

Almost anybody can service a Bristol Series 500 Controller.

3 ALL RESET CONTROLLERS HAVE RESET ACTION STOPS

Ask about this *new* advancement in automatic control.



Reset rate and derivative time adjustments are calibrated in equal percentage (or logarithmic) steps. Changes of one step up or down from any setting will produce a change which is a constant percentage of the previous setting—the most convenient way to calibrate an industrial adjustment.

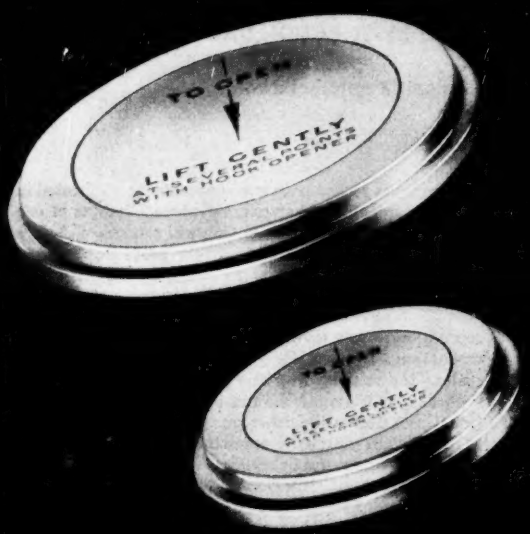
With these calibrated adjustments, you can positively reproduce, at any time, any previously-established control action . . . by merely duplicating the settings on the scales—in the same or in any like Series 500 Controller.

Five types of control: on-and-off, proportional, proportional plus derivative, reset, reset plus derivative.

Investigate your new opportunity for accuracy and uniformity in automatic control. Write us for new bulletin. THE BRISTOL COMPANY, 115 Bristol Road, Waterbury 91, Conn. (The Bristol Co. of Canada, Ltd., Toronto, Ont., Bristol's Instruments Co., Ltd., Lynch Lane, Weymouth, Dorset, England).

Safeguard Food Products from Plant to Kitchen . . .

ANCHORVAC* D CAPS



FOOD products reach consumers as packed when sealed with *Anchorvac* D Caps.

They give the most efficient, most dependable tamper-proof seal known for foods packed in tumblers, jars and bottles. They provide fullest protection against air, moisture or bacterial action —whether you vacuum pack, sterilize, process, pack hot or cold.

The seal of the *Anchorvac* D Cap is mechanically formed well below the top edge of container by compressing the sealing gasket into a tight, even contact with container finish. *Anchor* Sealing Machines are available at nominal annual rentals to apply *Anchorvac* D Caps at speeds from 20 to 125 per minute.

*Trade-Mark

ANCHOR HOCKING
GLASS CORPORATION
Lancaster, Ohio

IN PROCESSING
It's Shock-resistant Anchorglass*

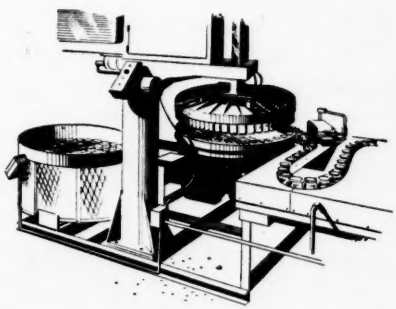
REMOVING packages from collecting tables—stacking in processing crates and loading in retorts—heating and cooling under pressure—all require uniformly strong and tough glass containers.

Anchorglass Containers are designed and manufactured to easily withstand these handling knocks and temperature changes that are part and parcel of processing operations.

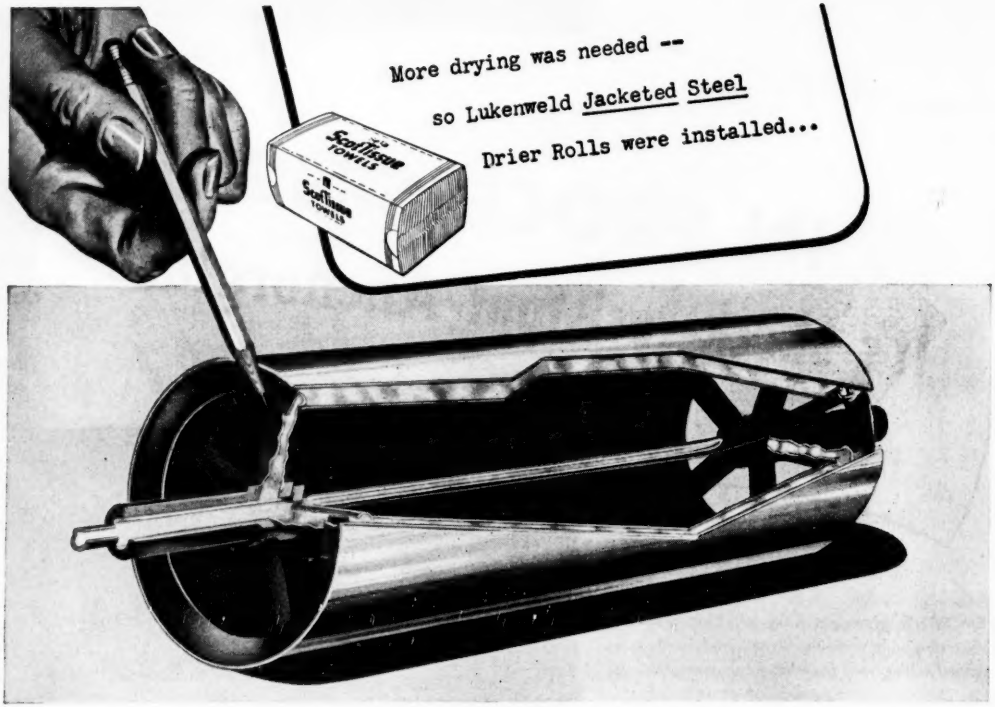
Their strength and durability result from professional care and know-how in manufacture, uniform distribution of glass, consistency in manufacture, accurate temperature control in annealing and quality control through constant tests and inspections.

Anchorglass Containers are available in all standard styles, capacities and finishes, in crystal, amber and emerald green glass. May we submit samples and prices?

*Reg. U. S. Pat. Off.



ANCHOR HOCKING
GLASS CORPORATION
Lancaster, Ohio



Towel machine at SCOTT PAPER COMPANY reaches an acceptable production rate faster...*with safety*

When engineers at Scott Paper Company required extra drying capacity on a paper towel machine, they installed a number of Lukenweld Jacketed Steel Drier Rolls in the machine.

The needed drying was thus supplied, with an extra dividend of safety due to the welded steel construction of these rolls. They contributed to the successful start-up of the machine and the early attainment of an acceptable rate of production.

Lukenweld Drier Rolls owe their performance to these factors: Their jacketed design gives positive scavenging of entrapped air, film and condensate from steam passages, assuring high efficiency. Made of steel plate, wall sections can be thinner with safety, giving rapid heat transfer, with even and constant surface temperatures.

Whatever your roll-drying problems, Lukenweld can serve you. Our engineers will help select the rolls you need, and even design and build the complete machine. Pressures up to 350 psi and higher can be safely employed.

Bulletin 358 tells you more about Lukenweld Jacketed Steel Drier Rolls. For a copy, and for help on your machinery requirements write Lukenweld, Division of Lukens Steel Company, 401 Lukens Building, Coatesville, Pa.

LUKENS
LUKENWELD DIVISION

DESIGNERS, ENGINEERS AND MANUFACTURERS OF MACHINERY

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increases capacity and reading accuracy

K type HCF tube

The K Type "HCF"* Tube . . .

Increases Rotameter capacity . . .
Provides stability for rotors of various designs . . .
And assures easy, accurate reading . . .
Of fluid rate-of-flow . . .
Clear or opaque.

Three equally spaced guides or flutes . . .

Center and guide the rotor . . .
Throughout the length of the tube scale.

The intimate contact . . .

Of the rotor and flutes . . .
Insures rotor visibility . . .
And metering accuracy.

You can convert your K Universal Rotameter . . .

And gain the advantages . . .
Of the Type "HCF" Tube . . .
At a reasonable cost.

Write for Bulletin 18-RA . . .

And get complete details.

*High Capacity Fluted

SCHUTTE and KOERTING Company

Manufacturing Engineers

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VALVES • ROTAMETERS • FLOW INDICATORS • GEAR PUMPS • STRAINERS
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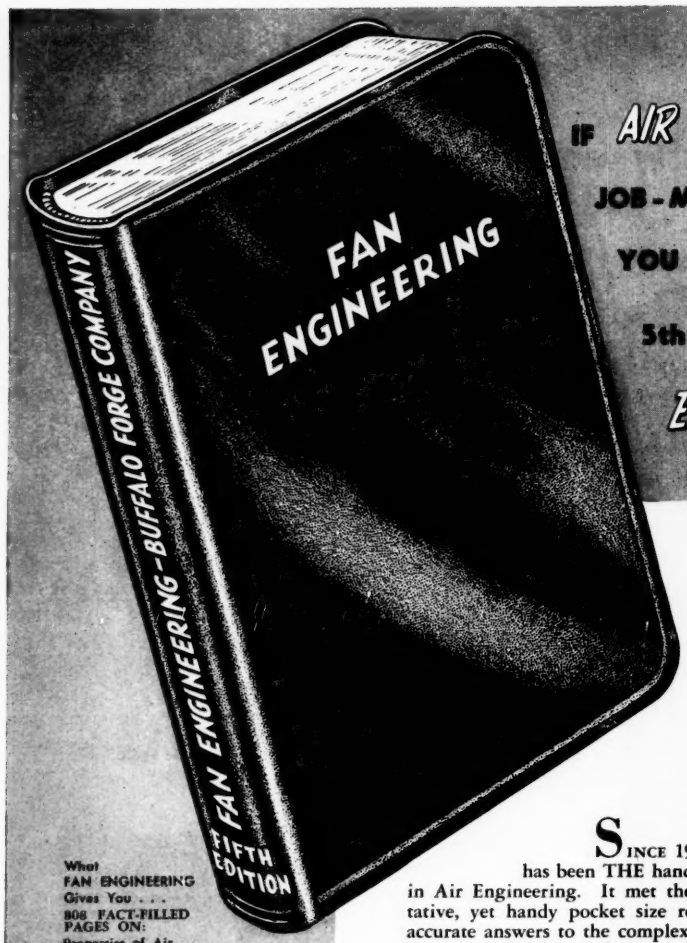
"Visit the Fourth National Instrument Exhibit, Municipal Auditorium, St. Louis, Missouri, September 12 - 16, 1949. See our Display in Booths 142 and 144."



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VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

YOU GET TWO DISTINCT BENEFITS FROM THIS PURE MSG

Ac'cent INTENSIFIES —and SUSTAINS— the flavor of the foods you pack

In 100 lb. and 200 lb. drums

● The two amazing effects of Ac'cent in canned foods are separate, distinct, and true . . . proven beyond doubt in tests run on a production basis . . . proven beyond doubt in actual *use* by many food processors whose products you know.

First, Ac'cent INTENSIFIES flavor, brings out more of the good natural flavor of the food itself. It adds no flavor, no aroma, no color of its own.

Secondly, Ac'cent SUSTAINS flavor—guards it against "flavor-loss" in processing.

The two effects of Ac'cent add up to one result, and that is an "edge" on flavor. Surely, simply, economically, you get such an edge with Ac'cent. Our staff of food technologists and chefs is on call to discuss with you in your plant the possibilities of Ac'cent in the type of foods you pack.

Wire or phone for more information. You should look well into this unique product that *makes food flavors sing!*

Amino Products Division, Dept. FI-8
International Minerals & Chemical Corp.
20 North Wacker Drive, Chicago 6, Illinois

Ac'cent is MSG— *a 99+% pure mono sodium glutamate, derived from vegetable sources.*

A typical test of Ac'cent® in lima beans

Add ¼ to ½ teaspoon of AC'CENT to a filled #2 can of your lima beans just before sealing. Mark the can so that it can be identified, then process it right along with the rest of the batch. After cooling and aging a few days, cut the AC'CENT sample and a control. Notice how much fresher and richer is the flavor of the beans to which AC'CENT has been added.

Ac'cent® **makes food flavors sing!**

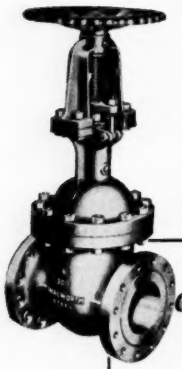
Trade Mark "Ac'cent" Reg. U.S. Pat. Off. Printed in U.S.A.

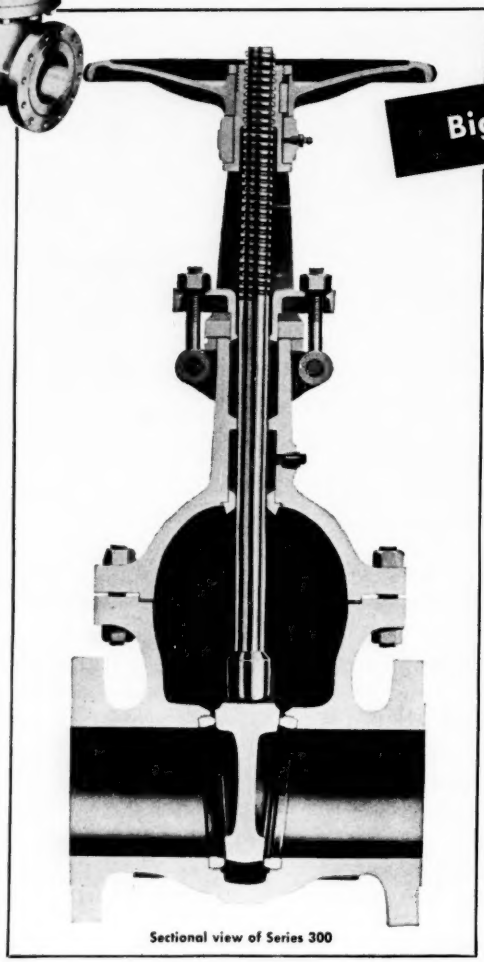
WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke





Sectional view of Series 300

Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2" to 24") insure tightness and maximum packing life — costly leaks are eliminated.

Bonnets and Bodies are engineered to withstand pressure and minimize distortion — they're tough, durable, dependable.

Heavy Steel Walls provide extra strength and longer life.

Integral Body Guide Rib Faces are machined to insure accurate disc seating.

Seat Rings are bottom seated — not flange type. No recess exists at back of ring — hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

For Series 600 and higher, we recommend Walworth Pressure-Seal Steel Gate Valves.

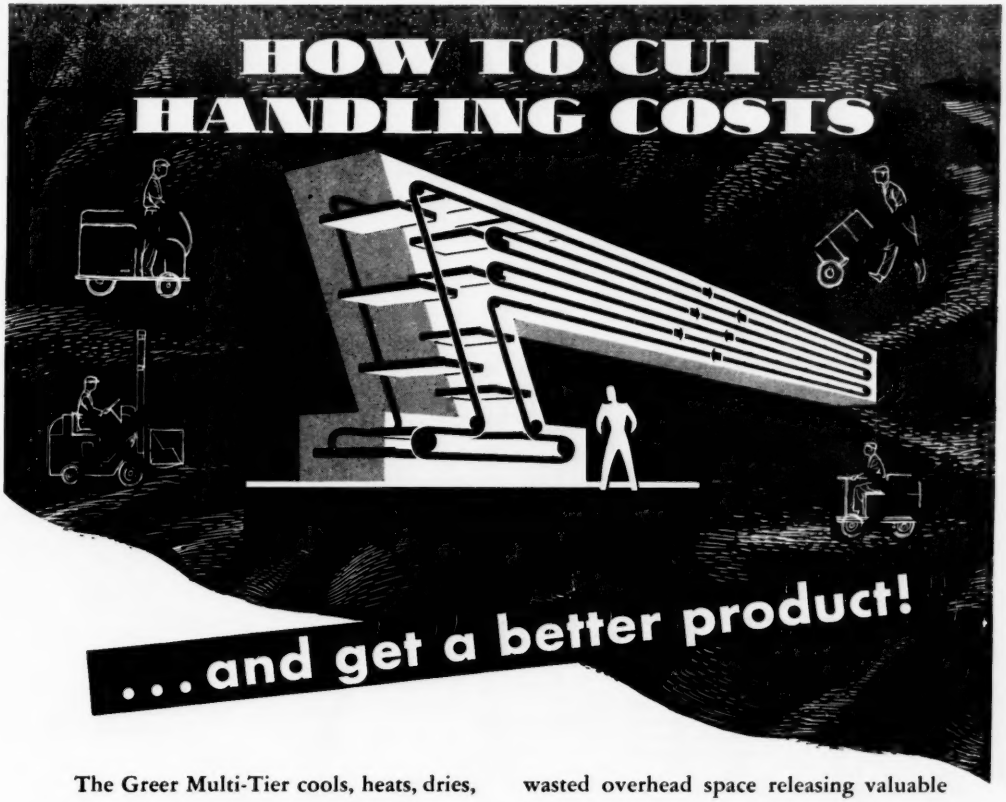
For further information on Walworth Cast Steel Gate Valves, see your local Walworth distributor, or write:

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



The Greer Multi-Tier cools, heats, dries, freezes, cures, moulds, humidifies or pasteurizes your product continuously and automatically under whatever exacting conditions you specify. Accurate control of processing conditions assures uniform quality. Because the Greer Multi-Tier receives, processes, and delivers your product automatically, at any point in your plant, costly handling is eliminated.

The Greer Multi-Tier utilizes otherwise wasted overhead space releasing valuable floor space for other operations. Your product moves on trays without jar or jolt at whatever speed is necessary to match your rate of production for as many minutes or hours as your process requires.

Write today for complete information. Let us show you how the Greer Multi-Tier can improve your product, cut your production costs and release valuable space in your plant.

J. W. GREER COMPANY
125 WINDSOR ST., CAMBRIDGE 39, MASS.

GREER
MULTI-TIER

Manufacturers of *Continuous* Production Machinery

FINDINGS OF FACT CONFIRM HIGH VALUE OF ENRICHMENT

ENRICHMENT has been elevated to a new high level of national and social significance. The far-reaching Newfoundland Nutritional Surveys* have decisively demonstrated the part that flour and bread enrichment can play in reducing infant mortality, lowering the tuberculosis death rate and over-all death rate, decreasing signs of malnutrition, and increasing the alertness of children and grownups alike.

BEFORE ENRICHMENT

The first of these large-scale fact-finding surveys was conducted in 1944. Signs of malnutrition were widespread. Infant mortality and tuberculosis death rates were two to three times as high as in similar populations. Enrichment with thiamine, riboflavin, and niacin was then put into effect.

AFTER ENRICHMENT

Four years later, in 1948, the second survey showed a dramatic reduction in signs and symptoms related to deficiencies of these essential nutrients. Gone to a great extent was the apathy so noticeable in 1944. Deaths from tuberculosis had decreased sharply, and the rate of stillbirths and infant deaths was strikingly reduced.

"Nutrition . . . has its significance in its relation to health. Health is defined in the World Health Constitution as follows: 'Health is the complete state of physical, mental and social well-being, not just freedom from disease and infirmity.'

"What can nutrition do? It can prolong life, give better bodies; make people happier, give them greater economic status; provide opportunity for greater social significance."

—National Health Assembly, May 1-4, 1948

A CHALLENGE AND OPPORTUNITY

Here is a clear-cut confirmation of the high value of bread and flour enrichment to the national health. Here is a challenge to America's milling and baking industries, which have the enviable opportunity of bringing more buoyant health and greater physical and mental vigor to the people of America—through ENRICHMENT.

**These surveys were supported by the Newfoundland Government, the Newfoundland Tuberculosis Association, the individual investigators, and Merck & Co., Inc.* (The Canadian Medical Association Journal, *March 1945 and April 1949.*)

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FOR ENRICHMENT AND FORTIFICATION

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pick and shovel days are over

Bull-dozers and steam shovels ended pick and shovel methods in earth moving. So modern strip mill facilities banished pick and shovel techniques in rolling stainless sheet and strip. Climaxing this progress, CRUCIBLE, a *specialty steel* producer for half a century, has built an $18,000,000 mill at Midland Works *specifically* for rolling stainless steel—the *first mill* that has ever been built to take complete advantage of the *best* in stainless rolling practice.

You would expect this of CRUCIBLE. You would expect that the top organization in the *specialty product* field would make stainless as a specialty—and you would be right. Here at Midland, hot and cold rolled stainless sheet and strip are made in widths from ½" to 50" inclusive, in all gauges, grades and finishes, with the same precise quality control that has made CRUCIBLE the leader in special service steels for generations.

Moreover, with Trent Tube Co. joining the organization you can now turn to CRUCIBLE for *every* type of stainless—sheets, plates, strip, bars, tubing, forgings, wire and castings. Data sheets are available for all grades. Your inquiries will have prompt attention.

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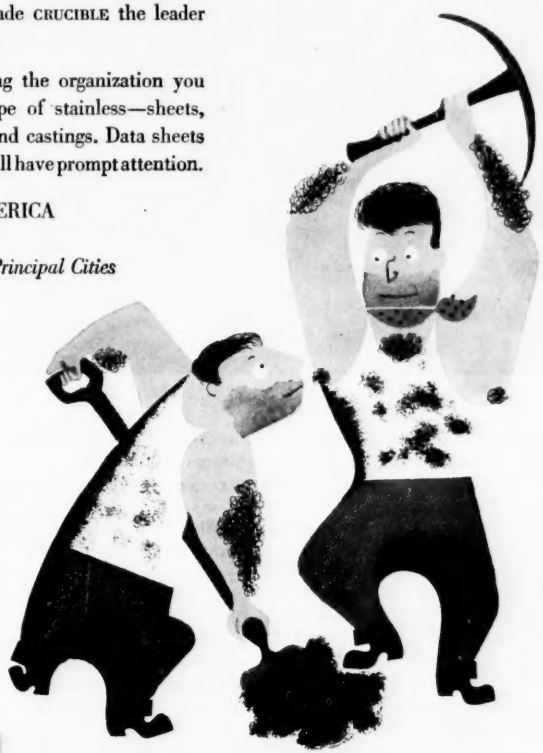

CRUCIBLE first name in special purpose steels

hot and cold rolled **STAINLESS SHEET AND STRIP**

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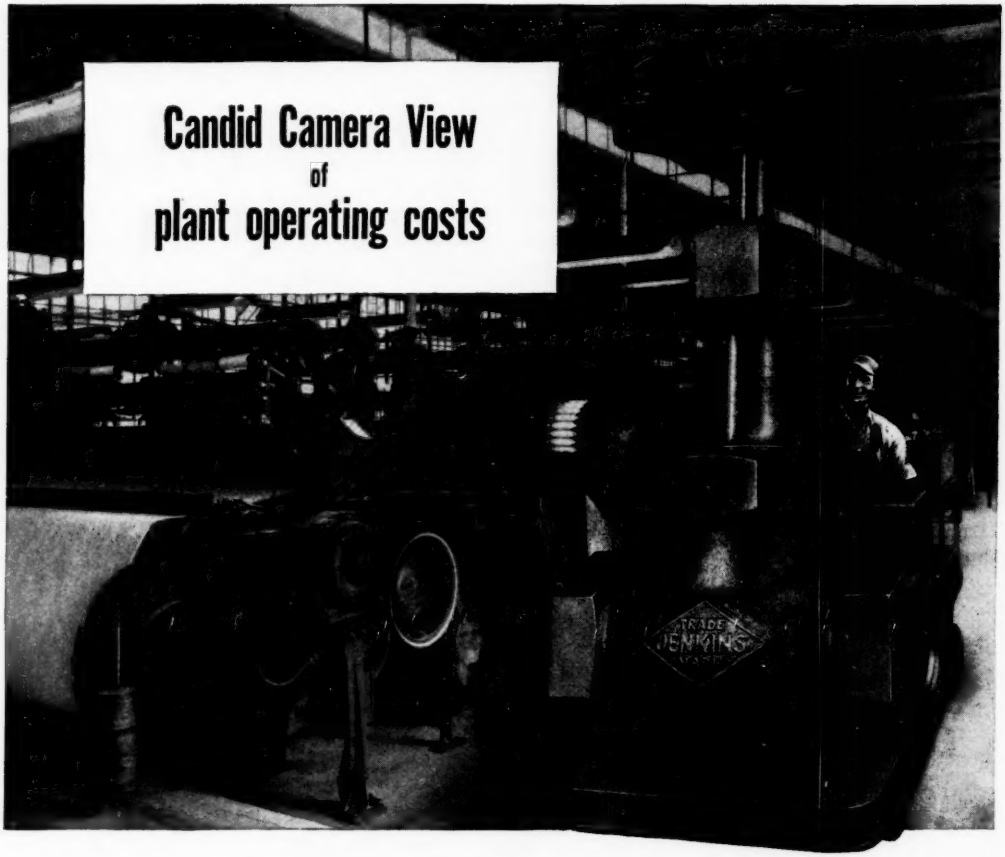

FOCUSED on operating costs of a textile plant, a truly candid camera would record this view of valves in proper relation, cost-wise, to other equipment. By the simple photo-magic of showing *all* valves in the plant as *one* valve, the picture points up an important fact—that valves, collectively, are a major investment in *any* plant, *any* large building where operation involves fluid control.

IT PAYS MANAGEMENT to keep this fact in mind. With wages and material costs the highest ever, valve maintenance costs must be watched as carefully as operating expense of larger plant units.

EXCESSIVE MAINTENANCE of one inferior valve is insignificant, but multiplied by thousands, it is a serious drain on operating budgets.

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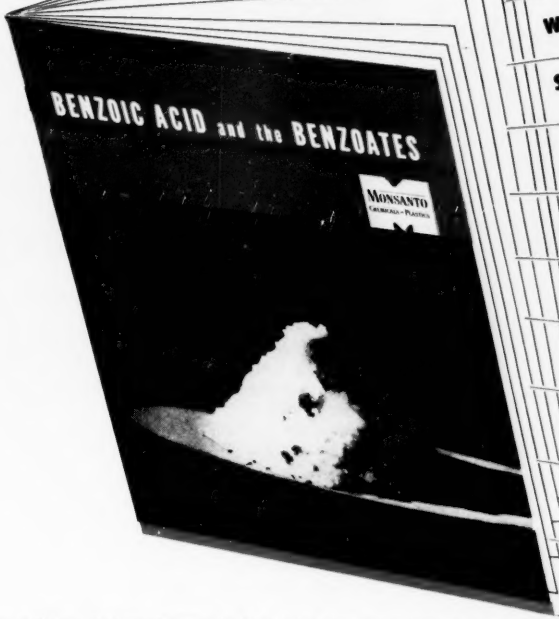

- FOOD PRESERVATION
- STATE LAWS COVERING SODIUM BENZOATE
- WHY DOES FOOD SPOIL?
- SODIUM BENZOATE PRONOUNCED HARMLESS
- OPTIMUM CONDITIONS FOR PRESERVING
- FOODS PROTECTED WITH BENZOATES
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SERVING INDUSTRY . . . WHICH SERVES MANKIND

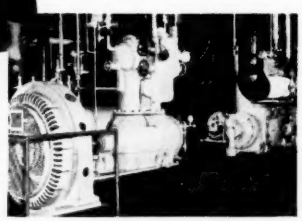
in frozen-juice processing, too, G-E drives help "keep it continuous"

Direct-mounted on a refrigerator compressor at Vacuum Foods is a 100-hp G-E synchronous motor for maintaining exact speeds and correcting power factor. Its control panel (above) is typical of many G-E controls in the plant that help keep operations flowing smoothly.

For reliable performance and close quality control, G-E equipment is used practically throughout at Vacuum Foods

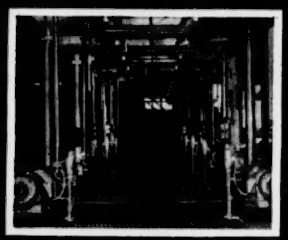
Here's an example of a food plant that decided to "go continuous" right from the start. It's the Vacuum Foods Corporation plant at Plymouth, Florida, processing Minute Maid frozen orange-juice concentrate. As many others have done, it turned to General Electric to supply and co-ordinate practically all its electric equipment. Now this plant, too, knows how G-E motors and control can help keep a processing line running at top capacity, contribute to uniform product quality.

If *you* are planning on "going continuous" to reduce handling costs in your food plant operations, it will pay you to check first with a G-E sales engineer. Backed by a staff of engineers specializing in the food industries, he can help you obtain the many advantages of continuous processing methods at lowest cost—by efficient application of G-E motors and control. Call him at your nearest G-E office. *Apparatus Dept., General Electric Company.*

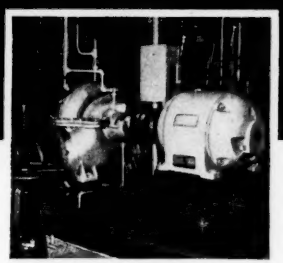


Food Plant Drives

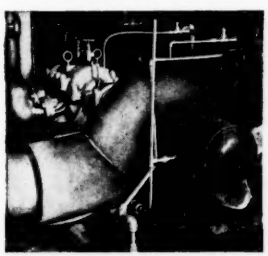
GENERAL ELECTRIC



Pumps shown here that circulate juice at high speed through a vacuum evaporation system are driven by a group of 2-hp G-E totally enclosed fan-cooled motors. In cast-iron construction that resists corrosion, and protected against dripping or splashing liquids, these sturdy motors require only a minimum of maintenance.



With 3500 gallons of water per minute needed, pump motors must be especially dependable. This 75-hp G-E Tri-Clad open (dripproof) motor, one of many throughout the Vacuum Foods plant, provides a high degree of service continuity in driving pumps for the water circulating system.



Here, a 40-hp G-E mechanical drive turbine drives one of the plant's boiler feedwater pumps. For food plants using process steam, G-E turbines provide a reliable, low-cost machine drive while also acting as a reducing valve to furnish low-pressure process steam.

G-E Battery Chargers for electric trucks

KEEP EM ROLLING

At the Vacuum Foods Corporation plant in Plymouth, Florida, frozen orange-juice concentrate is moved quickly and continuously by means of electric battery trucks. To help insure the uninterrupted service needed for top-capacity production, the plant makes extensive use of its G-E copper-oxide battery-charging equipment. Among its many advantages that have "sold" Vacuum Foods are these:

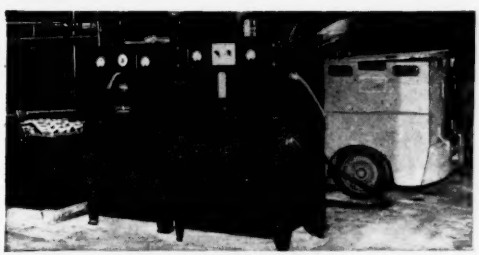
Fully automatic. After operator sets a control, the charger takes over, delivers the charge, and then shuts itself off.

Easy to use. Operator just plugs in the cable leads, and the charger does the rest. No special equipment is needed for installation.

On-the-spot charging. Units can be easily moved, or placed strategically to be ready and handy when needed. No time or manpower is wasted running trucks to and from a central charging station.

Long life. The G-E copper-oxide stacks—heart of the charger—have exceedingly long and dependable service life. Nothing moves except a fan, so there's little to wear out and be replaced.

General Electric's complete line of battery-charging equipment, including motor-generator types, is available through your truck dealer or distributor. Bulletin GEA-5249 gives complete information.



The low cost of G-E copper-oxide battery chargers, like these two at Vacuum Foods, is quickly amortized by savings in time, faster movement of materials, and more efficient use of manpower.

See "Materials Handling"! How electric trucks and other modern materials handling equipment boost productivity is shown in this G-E sound and color motion picture. Your nearest G-E office will gladly arrange for a showing.

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☐ **GEA-4322**—Electric equipment for the food industry
☐ **GEA-5249**—Copper-oxide battery chargers

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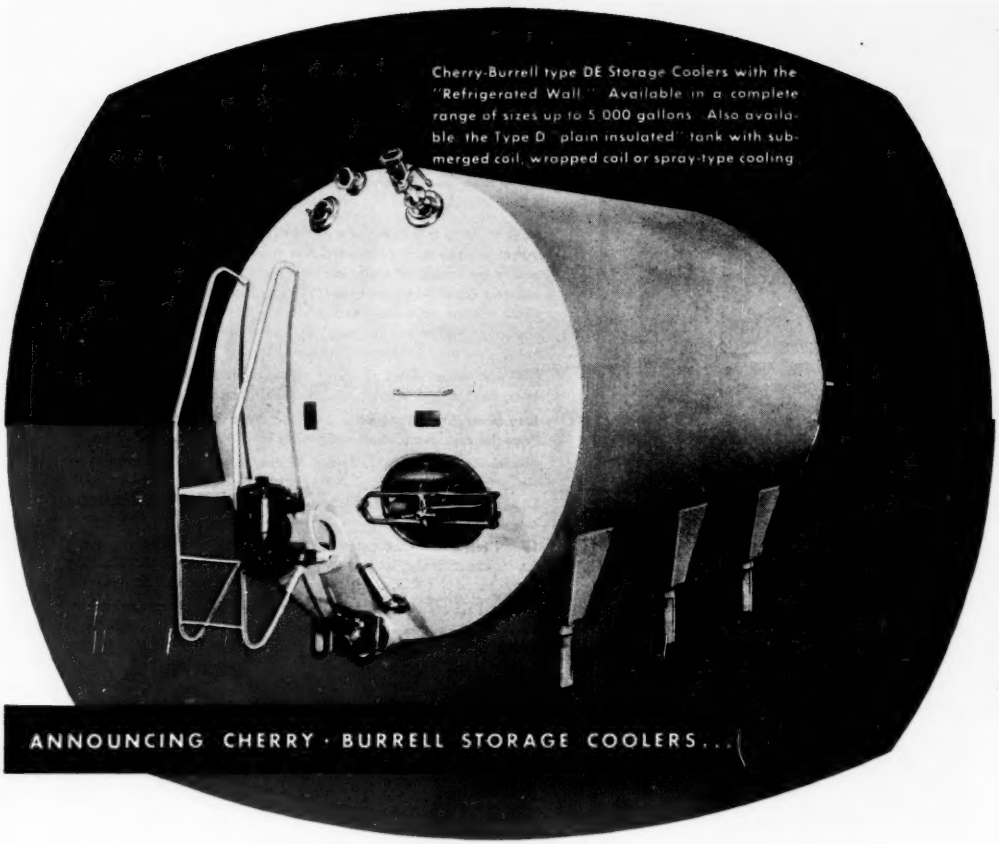
Cherry-Burrell type DE Storage Coolers with the "Refrigerated Wall." Available in a complete range of sizes up to 5,000 gallons. Also available the Type D "plain insulated" tank with submerged coil, wrapped coil or spray-type cooling.
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the New "Refrigerated Wall" Storage Tank

for products where additional cooling is desired

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Inside and out, these modern, quality tanks offer many *advanced* Cherry-Burrell features. Heavy stainless steel lining with stainless steel vertical coils welded to the outside surface. Interior refrigerated surface *noticeably smoother* than the accepted standard in previous designs. Vertical coils provide free-flow, fully flooded refrigerant passages and shortest gas travel for maximum refrigerating effect. Deep dish heads have greater "knuckle radius" for greater strength and easier cleaning.

Ask your Cherry-Burrell representative about the new Type DE "Refrigerated Wall" Storage Tank *now* . . . now, when efficient, economical equipment is so all-important to your profit picture.

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AUGUST, 1949

Food Industries

Brannan Plan Not Only Unsound But Dangerous

Now that Congress has become cagey about the Brannan Plan, there will at least be time for the country to evaluate its significance before it becomes a law.

The supposed economic benefits must be measured against this simple truism: "You can't get something for nothing." If the farmer gets more and the consumer pays less, taxes make up the difference. And since the bigger part of any tax increase is likely to be paid by corporations, business will be Brannan's Santa Claus.

As a food processor, you might figure that the lower cost of government-subsidized raw materials would much more than offset your tax increase. And indeed it might for the first year of the plan. But after that, government control of acreage would reduce production to boost prices. Then your lower cost vanishes, but the established higher tax rate would remain.

So in the long-haul, processors won't gain anything from the Brannan plan except more taxes. And if there is anything business needs it is lower taxes to leave manufacturers enough of their earnings to modernize their plants to increase productivity and cut costs.

As a matter of historical fact, that is the key to the high economic level in this country. It has steadily increased the amount of goods produced per man-hour and thereby raised wages and brought about a high standard of living.

Even worse things than higher corporation taxes and a modernization slow-up would come from the Brannan Plan. The farmers would give up the freedom which they prize so highly. From their viewpoint, the plan is a bear-trap baited with honey, the bait being a guaranteed high income. But if they reach for the Brannan honey, the jaws of government control will close on their necks. And if they stop to analyze the long-range operation of the plan, they will see that even the honey is synthetic. All the government proposes to do is substitute artificial production control for the natural economic regulation effected by demand.

Consumers would make out best under the supply-and-demand system. With excess food producing capacity in this country, the supply would be high enough in relation to demand to assure reasonable prices.

And business in general undoubtedly would be better off with lower taxes and reasonably priced raw materials. In fact, there would be an incentive for research to develop new uses for low-cost raw materials, creating new products for consumers, new markets for farm products, and new jobs for workers.

Another probable fallacy in the agreements for subsidizing farmers is the now generally accepted claim that high agricultural income is essential to avoid a depression. This is theory, not proven fact. It seems more important that workers' wages be maintained through high capital expenditure for increased efficiency. Aside from increasing buying power, such expenditures themselves create a vast amount of work in factories.

And there is still another factor which argues for lower farm prices: Since consumers have been spending a third of their income on food, a lot of money could be made available to purchase durable products if food prices dropped so that only one-fourth (the prewar figure) of the income went to the grocers.

But here is the most dangerous aspect of Brannan-like plans, a danger so clear-cut as to be practically certain: It is another step toward the Washington brand of socialism which involves the creation of an economically unfeasible welfare state and unwise extension of government control.

This country was not built on security. And no individual or business which makes progress by reaching out for new fields to conquer can have guaranteed security. Yet it is such pioneering that makes progress. And you only have to look to bogged-down England to show what Socialism does to an industrial nation.

So even if the Brannan Plan were economically sound, it would be bad for the country.

—F. K. LAWLER, *Editor*

The Talk of the Industry

No Wonder Some Countries Are Backward

The other day, a canner from South Africa called our office for information about equipment. This he was given immediately and willingly. He was so astounded at such service that he remarked: "I never have seen anything like the way you people in this country give out information. Why does American business do this?" "Well," we told him, "that just happens to be the way we do things in America." Says he, "I'm still amazed, and I can't wait to tell our people about it."

A second visitor from the food industry in South Africa made a similar inquiry—with the same results. He not only was amazed, but so gratified that he sent a box of candy to the competent young lady who handles our reader-service department.

There is a moral in this that we hope our South African friends don't miss: Free interchange of information has contributed immeasurably to the unparalleled progress of American industry and science. Lack of such interchange has held many other countries back. And some of the under-developed areas could help themselves no end by adopting a "Point 4" of their own.

Experiment in Economic Distribution

One of the unsolved distribution questions of prewar days was whether ice cream would be distributed through retail food stores or whether frozen fruits and vegetables would be distributed through the usual ice cream outlets, mainly the soda fountain trade. In the late 30's, there were arguments aplenty for both sides of the question. During the war years, frozen fruits and vegetables were not rationed and naturally found their most avid distributors were the retail grocers.

The postwar years have seen an extension of this trend. But the merger of Foremost Dairies, Inc., with Maxson Food Systems, Inc.—ostensibly to effect economies of distribution—causes speculation as to whether Foremost will distribute through retail stores or buck the trend and distribute the Maxson precooked frozen foods through orthodox ice cream outlets. The experiment will be watched with much interest. The same applies to the more recently announced arrangement between Seabrook Farms and Southern Dairies. The latter is distributing Seabrook's frozen food line.

Europe More Self-Sufficient Foodwise

Congress has been told that ECA spending for foreign stabilization will be reduced to "manageable proportions" in a few years. Taxpayers are relieved to know that the present tremendous burden is thus to be lightened. But food company executives should understand that the curtailment of the foreign-aid program is being achieved by reducing the amount of relief, with a concentration of effort on the rehabilitation of foreign industry and trade. This means less food exports, nevertheless it is a logical move.

Progress in Europe toward food self-sufficiency has been most pursuasively demonstrated by the decision of the FAO Committee to discontinue fertilizer nitrogen allocation. If the world food situation were not generally very much better than heretofore, this action would not have been taken.

But the Oriental food situation continues very bad, notably in the rice-eating countries. The military collapse of Nationalist China tends to aggravate the difficulty and makes any means for relief more difficult. But if it does no worse than that, all of us will be lucky.

One Way To Foil Oleo Chiselers

It may be that the marketing of tax-free colored oleomargarine will be made legal. If it is, Beatrice Foods Co. has come up with at least a partial answer to the problem of preventing unethical restaurateurs from serving oleo as butter. It embosses plant-made butter patties with a wreath-like scroll on the outer edges and imprints the word "BUTTER" inside this in block letters.

An interesting incident at a meeting of the Chicago Society of Dairy Technologists may have had something to do with this. Apparently unaware of the kind and caliber of his guests, the hotel manager served oleo. Naturally bedlam broke loose. And the meeting got under way again only after genuine butter patties had been placed on the tables.

Prepackaging No Job for Farmers

Field studies of the prepackaging of vegetables clearly demonstrate, according to the Agricultural Research Administration, the necessity for precooling and proper refrigeration. Research with broccoli in Florida this spring indicates that prepackaging on the farm is not feasible because suitable quick cooling and refrigeration usually are not available.

If broccoli is quickly cooled to 35 deg. F., it can be held at that temperature for marketing fresh and green for 7 days, and with only slight discoloration after 13 days. The farmer cannot achieve this quick cooling. His best efforts generally resulted in packages showing discoloration and soft rot after the second day.

Officials conclude that factory processing is essential for full success. So large-scale prepackaging remains a job which only the well-equipped "processor" can handle.

Hors d'Oeuvres

■ A writer for the *Wall Street Journal* says most U. S. residents wouldn't recognize an artichoke if they saw one. Bet, though, that those who didn't would do a lot of wondering.

■ A cracker industry spokesman has spoken: The biscuit and cracker business, he said, is experiencing a "temporary hesitation."

■ Hens up in Ontario are reported to be laying eggs with the outline of a number on them. Let's just pay no attention to this, thereby helping to prevent an epidemic of egg designs.

■ From a daily print comes the information that powdered saccharin is an ingredient of most lipsticks. About 1/200 of a gram, it says, is enough for the ordinary lipstick. Well, nutrition isn't everything.

■ Wholesale lamb prices in May were up in the 60's in New York City. Short supply, it says here, was the reason. Shears aren't in it with s.s. as a fleecing instrument.

J. A. J. J.

Simple, Inexpensive Tools Will Boost Food Production

WITHOUT proper tools and materials, growing areas such as this Chinese cabbage field could not be brought to full production. Both implement and insecticide being used here were made at FAO-financed plants.

Filling Empty Bellies Is World's No. 1 Problem

Hunger in under-developed areas is principal barrier to peace. Technical and mechanical aid, at low cost, would help greatly. Processing also needed

N. E. DODD

Director-General, Food & Agriculture Organization of the United Nations

Recently I returned from an around-the-world trip during which I visited some 17 countries. My purpose was to get first-hand information and impressions on the present ability of these countries to feed their own people—and to learn what could be done to help them most.

Before discussing some of the answers to this question—and in particular what can be done about it by food experts and technologists—I will have to touch upon one basic fact which underlies the whole world situation.

Directing Force

The people of the United States have hardly any conception of the single force that directs the day-by-day actions of millions—hundreds of millions—of people in the Near East and Far East. That force is not democracy, communism, capitalism or socialism.

It is the empty belly!

On the minds of millions of people as they wake this morning is this question: What can I do today to get enough food for myself and my family to eat?

It is an age-old question. We will not be able to answer it in a year. Eventual answers call for economic and social balances not yet reached. But millions of people driven by the whiplash of daily hunger can't work rationally toward such balances. In 10 or 15 years we possibly can remove hunger as a driving force in world affairs.

There are 200,000,000 more people in the world to feed than there were in 1938, and in total food supplies per person we are only just catching up to the point where we were 11 years ago. But 90 percent of the food is produced where it is eaten, and production and food needs have not been evenly matched. In fact, in some areas they are more out of balance than they were. Even 11 years ago, millions of people were not fed well enough to be healthy.

People are asking again: "Isn't the world producing people faster than it produces food to feed those people?" In some places the answer is no—North America, Oceania, Western Europe. In some places we are not sure. In others the answer is yes.

But this is in very large part because the knowledge and technical skill that we have to apply to food production and distribution today has not been put to work.

They can be put to work and they will be put to work. The important question, to my way of thinking, is this: How can our technical skills be put to use so that these millions of people can get the necessities of life within a framework of democracy?

Without enough food, crushed for

More Processing Know-How Will Avoid Waste

MEMBERS of FAO missions keep close tabs on developments Here a group is examining mud and straw filters used to extract salt in northeast Siam.

centuries between exploitation and illiteracy, they are prey to demagogues who promise a better life, more food, more security, and a higher standard of living than they have ever known. These promises cannot be answered with more promises. They must be answered with realities.

The starting place is more food. It's nice to have an education; it's nice to have a better home; it's nice to have good clothes. But first you must have a full belly.

Hungry Millions Bar Real Peace

Don't fool yourself. You can't have peace while millions of people are cold and hungry and ill clad. You can't write a peace treaty that will bring real peace until you have better conditions for these areas.

The basic needs are simple. The underdeveloped countries need technicians and simple agricultural and processing equipment. The potential demand for these two essentials is insatiable. This does not mean transplanting wholesale the technology of advanced countries to the less advanced. In many cases, great results would come simply from improvement of local technics already developed through long experience.

Industrialization and improvements in agriculture and food supply must go hand in hand. Industrialization is necessary to provide the tools and goods needed. It is necessary to provide jobs for people released from the land as farming grows more efficient. It must help to provide the income for increased consumption, including financing of imports.

There is a tremendous potential demand in these countries for products from abroad, but for the time being it will probably be mainly for equipment. For example, there will be a demand for agricultural machinery and fertilizers and for food processing equipment.

For several years, of course, there will be an unusual demand for certain basic foodstuffs, as there has been in the years since the end of the war. While this is tapering off now, it will continue to center on cereals—mainly wheat and rice. The underdeveloped countries lack dollars with which to buy other foods that they might like to have. And cereals are high in food value, are easy to ship, easy to store, easy to distribute.

The economies of this can be illustrated by citing any one of a number of countries. As an example, one large Eastern country now needs 5,500,000 tons of food imports, to provide even a minimum diet. But she can afford to import only 3,000,000 tons. The result for many people must be under-nourishment and semi-starvation. How can there be any other choice but cereals for such a country where, in some areas, the ration of rice is something like 9 oz. a day—about the equivalent of half a loaf of bread?

Technical Help Will Create Markets

One of the great needs is technical help. The resources are there—the land, the water, the manpower. But the method of food production still is very primitive.

Once such a country gets economic development underway, the demand will skyrocket for equipment from the more advanced countries, including the United States. In fact, this demand already exists, dammed up by the dollar shortage, which causes the importing countries to look toward nondollar areas.

In more than one country in the Far East, for example, there are great fishing areas off the coasts. But the fish that are caught can't help a country's food shortage much except in the port cities. Reason is that the people lack almost all the facilities required to make maximum use of this great resource—such things as processing, transportation, and refrigeration equipment, which the people of the United States take for granted.

So the fish do not get into the interior, except where special drying practices have been developed.

On the other hand, if the necessary technical equipment and knowledge are made available, the country will benefit not only from the fish as a food, but also from the byproducts—fish oil and fish meal.

Another example: In East Bengal I saw a demonstration of an irrigation pump, a simple gasoline water pump. The farmers there, who must have water for their land, were tremendously impressed and excited with this "revolutionary" device to bring water out of a canal onto their fields. They were demanding that their government supply them with these pumps—a mechanism they never knew existed until the day they saw one demonstrated in their community.

If 100 such gasoline pumps could be demonstrated in the right areas in any one of a dozen countries, there soon would be orders for 100,000. Similar simple demonstrations would bring huge demands for hand tools and other kinds of mechanical equipment. But the countries will need the help of able technical men to use these new tools effectively. The increase in food production that could be brought about through the proper use of such everyday tools would automatically increase production, purchasing power, and the need and demand for more specialized and complex equipment.

On this higher level of equipment, one of the first needs is milling equipment. That is to be expected in countries that depend heavily on cereals.

One other important example is disease control. Sick people can't farm. In cooperation with the World Health Organization, FAO already is working on the problem.

Need to Start Ball Rolling

A few million dollars for technical aid, intelligently spent on carefully developed programs, would make the greatest single contribution of anything that could be done in this field. Definite, practical action is needed to start the ball rolling.

FAO has been doing exactly the sort of thing President Truman had in mind when he made his Point Four proposal. But right now FAO has about $5,000,000 a year contributed by its 58 member nations to carry on its technical assistance and other services to all its members. We have on our staff about 200 experts all told—not a very large number. So the projects we now can take on are limited.

Doubled or tripled, this kind of program still is inexpensive. In 1948-49, for work in roughly comparable fields within the U. S., this government will spend over $500,000,000. This helps account for advanced technology and high productivity. No international program can substitute for such national activities.

Take another comparison: Each average hour of the war cost the U. S., more than $8,000,000. The world cost was more than $25,000,000. What the free world spent was an investment in defeating aggression. The cost to the U. S. of only an hour of the war, if spent in increasing technical assistance, would be a very modest investment in defeating the misery that gives aggressors a foothold. But a great deal could be done with it.

Program Started

With its limited budget, FAO long ago started taking the first steps along the kind of road indicated by the Point Four proposals. We have specific projects on which our technicians are working. We are collecting and disseminating the data that governments had in mind when they set up FAO to be the center of information on world food problems. We consult with individual governments to help them analyze their problems and set their goals.

Our work breaks down into these fields: Economics, forestry, nutrition, fisheries, rural welfare, agriculture and information.

So far FAO has not done much work in the field of food preservation and processing, but we plan to do more. Last fall, for instance, FAO organized a technical meeting on food freezing and refrigeration in Copenhagen, which was attended by technicians from 13 European nations and the U. S. We have had other similar meetings.

Food preservation and processing is very important—for the lack of it causes waste of large amounts of food. We have had experts in some of the back areas of China, Greece, Czechoslovakia and other countries, not writing reports, but showing farm men and women how to better preserve and process foods now often wasted. Much more of this practical work is needed in many countries.

Here are a number of specific fields that we think especially important, in which technicians and technical equipment will be needed:

Cereal technology — Improved methods of processing, particularly the milling of grains—for example, rice in the Far East—are needed to prevent waste and improve the nutritive value of cereals as they are consumed. Methods widely used now result in the loss of significant food values. Construction of proper grain storage and control of infestation likewise are most important programs already underway.

Fruits and vegetables—Canning and drying can help in avoiding losses of seasonal foods. Developing the local industries that are needed would require, in many cases, setting up pilot-scale demonstration plants with outside technical help.

Home preservation—This is mostly a "show how" problem. But many countries would need outside experts, at least for a period of time, to help publicize the introduction of improved and new methods.

Fish liver oils—These oils, rich in vitamin A, are wasted in some areas where vitamin A is particularly needed in the diet. The need is for appraisal of the sources of supply, followed by technical assistance to develop production.

AUTHOR (right) examines rice seeds at Siamese farm on trip covering 17 countries where assistance is needed.

Food yeast—Carbohydrate material not used for human food can be converted into yeast rich in proteins and B vitamins. Such food yeast has been produced successfully on a factory scale, and much work has been done in Jamaica and Germany. Technical help is needed to determine the possibilities of production and to develop ways of working the yeast into the diet.

Fish and fish products—Special methods of drying and processing fish have a foothold in the Far East. But there is room to improve this technology and introduce it into other areas where it is not now used.

Milk and milk products—Too large a part of the world's available milk supply is wasted by inefficient methods of handling and processing—or by failure to make the best use of such valuable products as skim milk. FAO already is working with the International Emergency Children's Fund in Europe, providing technical assistance on methods of handling and processing dairy products. There is a need for similar assistance to countries in Latin America and the Far East.

Developing alternatives for milk—This is greatly needed in many countries in the Orient. The development of easily emulsifiable powders made from soybean and other pulses would be of much value.

These are the kinds of projects in food technology that FAO has started and hopes to stimulate further. They are all problems for food technologists and technicians, for the experts in getting such things done.

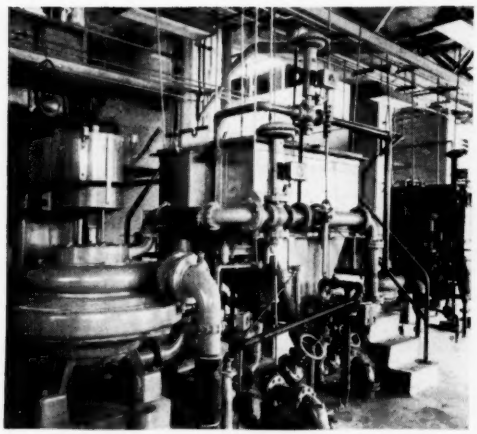
The technically-trained people are the ones who will have to get them out of the planning stage and into the stage where action begins.

Technical Conferences

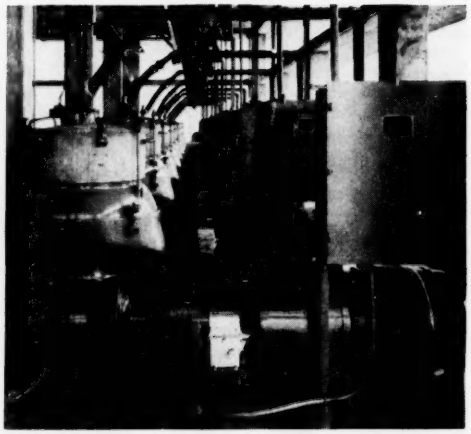
We have made a start in this direction. At our conference on refrigeration, for instance, the experts from the various countries swapped new ideas on the use of ice and dry ice, packaging materials and machinery, gas storage, and transportation. We received a great deal of help from the food industry both here and abroad in this meeting.

When Point Four is launched, there will be many opportunities for technologists from the highly developed countries and for extending the use of modern equipment. It is my hope that industry and finance will take advantage of these opportunities—in their own interest and in the interest of helping feed the hungry people of the world.

With these strikingly efficient cenrtifuges . . .

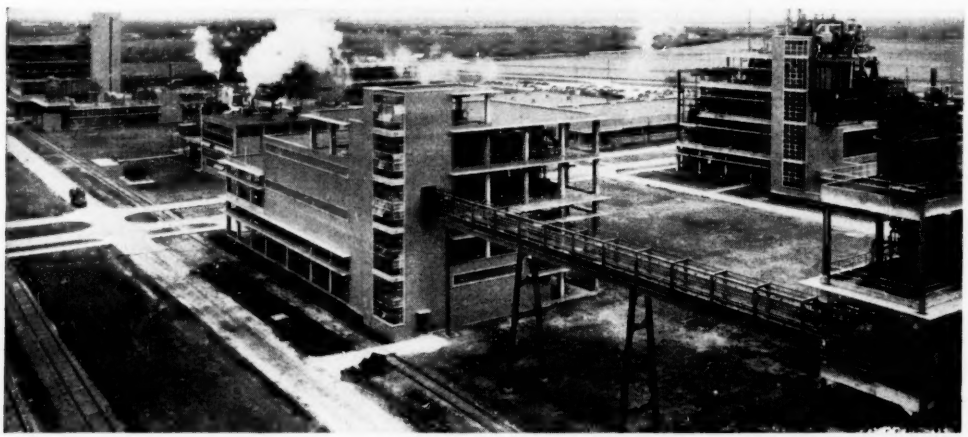


THIS UNIT is the Merco centrifuge that separates starch from gluten and makes the process continuous.



AND THIS equipment is the DeLaval dewatering centrifuge that concentrates gluten slurry on continuous basis.

. . . this plant has revolutionized the industry



PLANT is of functional, open-type construction—an architectural innovation. Elimination of curtain walls cuts costs, adds to workers' comfort and safety. Wide lawns separate buildings, and color scheme produces eye-pleasing layout.

Wet Milling Advances a Century—In a Decade

Machines now speed process, raise output, and cut space needs in an industry virtually unchanged for 100 years. Modern buildings accent advance

H. V. HIGHTOWER
Editorial Representative, "Food Industries"

Process innovations and architecture of functional distinction—comprising a notable development in the wet milling industry—mark the new Bluebonnet plant at Corpus Christi, Tex.

This modern facility has just been put into operation by the Corn Products Refining Co.

Bluebonnet is the first plant designed specifically to process sorghum grains, although it could handle corn if necessary. At present the intention is to process sorghum grains at the rate of 20,000 bu. per 24-hr. day, and to produce at the same rate 300,000 lb. of dextrose, 330,000 lb. of starch, 300,000 lb. of stock feeds and 20,000 lb. of edible oil. However, the layout of the plant and its major equipment permit a tripling of this output.

The plant is the outgrowth of ex-

perimental and pilot plant work done by the company several years ago and collaborative process design work carried out by Corn Products and The H. K. Ferguson Co., the general contractor. Improvements and innovations were suggested by a study of the company's other mills at Pekin and Argo, Ill., and North Kansas City, Mo., all of which were designed primarily to process corn.

Another factor contributing to the modernity of the Bluebonnet plant has been the development of new equipment and construction materials since the last completely new wet milling installation in this country was built by Corn Products at North Kansas City in 1922.

The company selected Corpus Christi as a site because of the suitability of the region for growing sorghum grains. In that vicinity is planted a dwarf variety of grain characterized by a relatively low, uniform height of plant suitable for combine harvesting. The company plans to buy grain within a 50-mi. radius, or farther if necessary. Availability of natural gas, of course, was another consideration. The mild climate, permitting the maximum use of out-door construction, was an encouraging element from the investment standpoint.

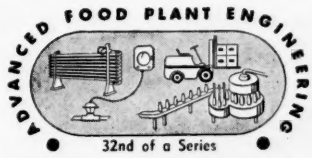
Among the praiseworthy attitudes of large manufacturers building plants in the Southwest has been their decision to spend money on installations that please rather than offend the eye.

The major buildings of this large plant are widely spaced. Areas around them are grassed and are planted with palm trees, in keeping with the general appearance of the coastal city of Corpus Christi, a few miles east of the plant. Particularly attractive is the administration-laboratory building, which is reached by a double-lane drive, lined with palms.

One of the architectural features is the absence of a mass of unsightly electric power lines and process piping. This type of disfigurement has been largely eliminated by a concrete tunnel, approximately 13 ft. high by 12 ft. wide, that carries utility piping. Power cables are carried in a separate underground system.

In the following description of the process operations will be evident the numerous innovations and widespread use of modern engineering materials that set the plant apart from others in the wet milling industry. These features are designed to improve overall operation and to minimize maintenance costs.

If grain is brought in by truck, the truck is driven onto a scale platform equipped with a mechanism by which, after weighing, the front end of the vehicle is raised, permitting the grain



to slide into a hopper where it is moved successively by a screw conveyor, bucket elevator and belt conveyor, to any desired point at the grain building. If brought in by box car the grain is unloaded by a pneumatic conveyor into a scale garner and thence into a weigh tank. Once the consignments of grain have been weighed, the material is passed through a cleaning and scouring operation, then either to storage, the steep house or a Randolph gas-fired dryer having a capacity of about 1,500 bu. per hr., depending on moisture content. The cleaners consist of three units which combine air separation and screening. Three scourers remove glume from the grain; they combine air separation and rotary beating.

The storage system consists of 56 concrete tanks and 36 interstices, the combination having a total capacity of 2 million bushels. A temperature indicating system, which permits the observation of grain temperatures at every 5 ft. of height, allows the detection of any heating during storage.

From the start to the end of the series of processes through which the grain and its components pass on their way through the plant, the use of instruments is considerably more extensive than in any other wet milling plant. At the beginning of the long journey from storage or the dryer, for example, the grain, on its way to the steep tanks, first passes into a weigh tank from which the desired amount for each of the steep tanks is released upon the belt conveyor by an automatic belt scale.

Process Starts With Steeping

There are 20 steep tanks, each with a capacity of 2,500 bu. These vessels have cypress walls and cast iron, cone bottoms, such materials being used to resist the corrosiveness of the steep water.

The water employed in the steeping process is that which is returned from other departments, and contains around 400 to 500 grains of soluble materials per gallon. The water, before entering the tanks, is pumped through two sulphur dioxide towers in series flow and cascades down over trays. Towers and trays are of cypress. Moving countercurrently to the water in each of the two towers is sulphur dioxide produced by burning sulphur in a horizontal rotary furnace. As in the steeping of corn, the function of the gas is to control the growth of organisms so that only the beneficial types are allowed to propagate. The water is advanced through the system of steep tanks so that the freshest water first contacts the grain that has been longest in the system.

A temperature of 125 deg. F. is maintained in the steep tanks and about 60 hr. is normally needed for the proper steeping of the grain. Such conditions are required to condition the grain for efficient separation into its components of starch, oil, protein and fiber.

Corrosion-resistant materials are widely used at all points where products containing SO_2 are handled or likely to be encountered around the steep house. This also applies to the mill house. In the steep house and mill house, process piping with a diameter of more than 3 in. is lined with vitreous enamel. All lines 3 in. in diameter or smaller are of copper. All areas under the pumps are lined with acid-resistant brick set in a phenolic cement. Piping used to flush the steeped grain to the mill house has fired ceramic lining. In the mill house all tanks with capacities of 600 gal. or less are of stainless steel composition, and all tanks over 600 gal. are stainless-lined.

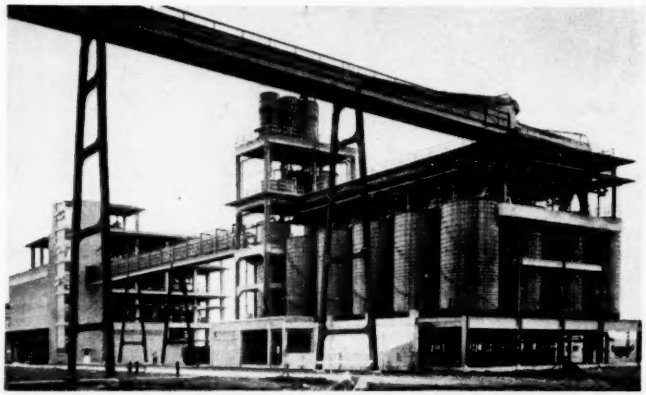
After the grain has been steeped, the water is withdrawn from the steep tanks and pumped to the feed house. Here it is concentrated in a triple effect evaporator, and the resulting heavy syrup is combined with protein stock feed produced in a manner to be described later.

Germ Separated by Flotation

The steeped grain is delivered to the mill house by use of an unconventional system whereby the grain is sluiced with process water that is subsequently returned to the steep house. Dewatering is carried out on stainless steel Rotex screens. The grain is dropped to a stainless steel grind control hopper. The grind controller is an Omega belt type feeder which permits grinding at a predetermined rate. From the feeder the grain is discharged to three degerminating mills, which are single runner, 36-in. plate machines operating in parallel. These mills break up the grain to permit the most efficient recovery of the germ.

The ground material moves by gravity to seven germ separators, which are open cast iron troughs where the specific gravity of the starch suspension is maintained at such a point as to float the germ from the fibrous portion of the grain. The germ is then passed over three groups of screens where adhering starch is removed by successive dilution with

THREE MAJOR OPERATIONS: First steeping . . .

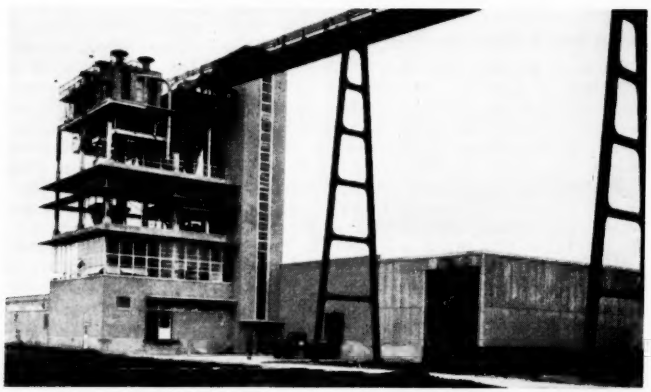


IN THESE cypress tanks, grain is steeped in water containing sulphur dioxide to condition it prior to milling.

. . . then milling . . .

DEGERMINATING MILLS (left) break up steeped grain before it goes to separators. Disintegrators (right) prepare grain for starch recovery.

. . . and finally packaging



STARCH AND SUGAR in bags are packaged in building at left, and then transferred to shipping warehouse at right.

water. The germ is moved next to pulp presses which remove a large portion of the water, which is then returned to process.

In the next step of processing the germ the material is dropped by gravity from the pulp presses into a rotary dryer heated with internal steam tubes. The rate of entry of germ into the dryer is so controlled as to maintain the residual moisture content of the product leaving the dryer at about 4 percent. After being elevated by an air stream to a hopper the germ is distributed to three oil Expellers equipped with cookers and conditioners. Water is added at the conditioners and the germ is kept at a temperature of 250 deg. F. to condition it for the most efficient recovery of the oil as it passes through the Expellers. In these Expellers the germ is moved on internal screw conveyors within a heavy slotted barrel designed to maintain the high pressures required to expel the oil. The oil is filtered in a plate and frame press and is then ready for shipment in tank cars to the company's plant at Argo, Ill., for refining. The volume of oil produced at Corpus Christi is not large enough to justify the installing of refining equipment there. The cake from the Expellers is moved by a screw conveyor to a cake mill where it is ground prior to being combined with other stock feed components produced in steps to be outlined next.

Coarse Fiber Removed by New Mill

Returning to the germ separators, the water slurry of starch and fiber from the separators is pumped over dewatering screens. The fibrous material is then discharged to one of three disintegrators for starch recovery and the separation of coarse and fine fiber. *Use of the Rietz mill for this service is new to the wet milling industry. The conventional plant employs a Buhr mill for such service.* Engineers at the Bluebonnet plant point out that use of the Rietz machine eliminates the coarse fiber washing system, improves recovery of starch, decreases maintenance costs.

The disintegrators, in combination with the Sprout-Waldron repulping machines, do the work of the older Buhr mills. Experimental studies at Argo showed that maintenance with this combination is likely to be less. Buhr mills require redressing every four or five days, during which time the mills are out of service for about 24 hours. It is supposed that a Rietz mill will have to be taken out of service only about once a month and can be restored to service within approximately 4 hours. In addition, the Rietz and Sprout-Waldron machines require appreciably less floor space

than would have been needed for a system of Buhr mills doing the same work. Finally, there is increasing difficulty in finding men skilled in the art of dressing the Buhr stones.

Because it handles slurry containing SO_2 the Rietz is of stainless steel construction. Unusual features are the use of a 360-deg. screen and the use of hammers mounted on a vertical drive shaft. Twenty-four hammers are fixed between 12 circular plates on the shaft and revolve inside the screen with a clearance of about ½ in. at 3,600 rpm. The fibrous slurry enters the machine at the top and as it is driven toward the screen the fiber separates into a fine portion that moves through the screen and a coarse portion that is discharged from the bottom of the machine. A spray of process water is used to wash the coarse fiber free of starch before it leaves the machine.

How Stock Feed Is Produced

At this point it seems advisable to trace the flow of materials that ultimately become bagged stock feed of 23 percent protein content. The coarse fiber discharge from the Rietz mills is sufficiently dry to be transported by a stream of air to the feed house. There the material is passed in parallel through three pulp presses, together with a portion of fine fiber from the Rietz operation, for the final dewatering. The material discharged from the presses is combined next with the heavy steep water sirup from the triple effect evaporator previously mentioned. This mixture is then conveyed to a flash feed dryer, which is a gas-fired furnace discharging hot gases to a cage mill where the wet mixture of sirup and fiber is introduced. The mixture is then drawn through an air transport tube by the hot gases and discharged into a cyclone; partial drying of the sirup-and-fiber mixture takes place during its movement through the transport tube.

An advantage of the flash dryer over other types that have been used in wet milling is that it is possible, through the rapid action of the flash principle, to obtain stock feeds of appreciably lighter color than would be otherwise produced.

The partly dried material is next moved by screw conveyor to a second-stage dryer of the type described above. Finished feed drops by gravity from the dryer to a rotary cooler, thence to packing hoppers, and is finally packed in 100 lb. bags.

Fine Fiber Taken Out by Screens

It is now desirable to return to the milling operation where the fine and coarse fibers are separated, and follow from there the course taken by the fine fiber, starch, and also the gluten.

The mixture of these three materials is discharged through the screen of the mill and passes over a set of dewatering screens. The filtrate, containing starch and gluten, drops into a feed tank supplying a string discharge drum filter. Filtrate from the drum is returned as steep water to the grain steep tanks. The filter cake is slurried with water and is handled as described below.

The fine fiber retained on the screens is discharged into two 36-in. double headed Sprout-Waldron repulping mills for the recovery of additional starch bound in the fiber. It has been mentioned above that these mills, used in conjunction with the Rietz disintegrators, take the place of a system of conventional Buhr mills. The Sprout-Waldron is substantially a machine of standard design but is fitted with specially selected attrition plates of cast alloy metal of great hardness. The grooved and ribbed plates are mounted on two oppositely revolving motor-driven horizontal shafts each moving at a speed of 1,200 rpm. Clearance between the opposed plates is 0.002 to 0.003 in. and is adjustable. Fine fiber enters the housing enclosing the two rotating wheels and passes through openings in one wheel to get between the attrition plates. The repulped material is then discharged from the base of the housing.

The fine fiber discharged from the repulping mills is diluted with wash water and pumped to screens equipped with nylon bolting cloth. Here occurs the separation of fiber and dilute starch slurry. The process of dilution with water and subsequent separation on a screen is performed a total of four times in series operation. The finally washed fiber is then pumped, along with water, to the feed house where it is combined with gluten and processed, as described below, to 41 percent protein stock feed. However, a portion of the fine fiber is combined with the coarse fiber and dewatered in the three pulp presses previously mentioned in describing the conversion of the coarse fiber into 23 percent protein stock feed.

Centrifuges Spin Starch From Gluten

The combination of fine fiber with the gluten occurs as follows: It has been pointed out that the fine fiber-gluten-starch mixture discharged through the screen of the Rietz disintegrator is separated on screens into (1) the fiber and (2) the gluten-starch mixture which is then obtained as a cake on a string discharge drum filter. The cake, after being slurried with water, is first pumped to a second string discharge drum filter where it is washed and then discharged to Merco centrifuges for separation of starch and high-protein gluten.

The Mercos operate at 2,500 rpm. The starch-gluten slurry enters the bowl of each machine and is discharged into the bowl near the bottom. The relatively light gluten begins to move upward and is discharged at the top of the bowl. Meanwhile, the starch is forced to the periphery and is discharged through 20 nozzles in the bowl; it leaves the centrifuge and enters a vent box, a container with a capacity of over 100 gal. A stream of product starch is withdrawn from the bottom of the box, while a portion of the material is drawn off from the surface of the starch in the box and recycled along with wash water to the centrifuge, entering at the bottom of the bowl.

Density Is Controlled

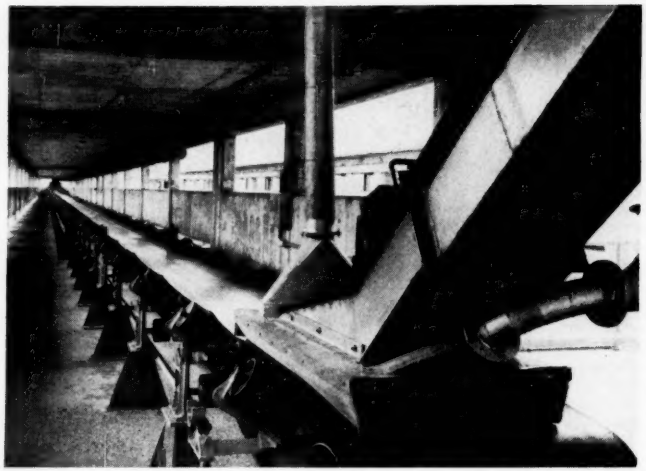
The vent box is a device for releasing entrained air, removing high-protein foam and for increasing the volume of starch being handled by the machine. By varying the rate at which product starch is being removed from the box at a given feed rate, and by maintaining fixed relationship between the feed rate and rate at which the wash water is added, the density of material in the machine can be controlled so as to obtain the best separation of the starch and gluten. Flow ratio controllers are used to maintain a constant ratio of feed rate to wash rates, whereas the usual procedure with such machines is to maintain a constant wash rate regardless of the movement of feed.

The separation in the centrifugals is accomplished in two passes of three machines each. The first pass produces a high-protein gluten and an impure starch fraction. The second pass produces a low-protein gluten fraction which is recycled to the first pass, and a pure starch ready for final washing. The second pass group of centrifuges operates on the starch from the first pass group, which throws out the gluten.

The gluten from the first-stage group is pumped to De Laval dewatering centrifuges for concentration. The concentrate is then pumped to the feed house, where it is dewatered on three string discharge, drum filters. At these filters a portion of the fine fiber is added to the concentrated gluten slurry and the fiber-gluten cake from the filters is discharged to flash dryers similar to those used in the previously described production of 23 percent protein stock feed. Here, the dried product is 41 percent protein stock feed. It is sold either in bulk or in 100 lb. bags.

With reference to the Merco centrifugal system, this is an important

Materials Handling Is Highly Advanced



THIS BELT CONVEYOR carries grain to huge 2,000,000 bu. storage tanks. Other conveyors move grain between trucks, elevators, and processing lines.

departure from conventional practice. The separation at this point has been previously performed by the use of long, narrow "tables" over which the starch and gluten slurry was allowed to flow at a controlled rate. During such operation the heavier starch particles settled out and the lighter gluten particles were carried over the ends of the tables by the slurry water. The advantages of the centrifuges over tables are the greatly reduced requirement for floor space needed per bushel of grind, improved housekeeping and improved quality of products.

A comparative estimate of floor space requirements for tables vs. centrifugals is interesting. If tables were used it is considered that 40,000 sq. ft. would be necessary to handle a daily grind of 20,000 bu. of original grain, or 50,000 sq. ft. to handle 25,000 bu. The area required for the six centrifuges, which could handle 25,000 bu. of grain, is approximately 1,500 sq. ft.

An additional advantage in using the centrifugals is that the time required for handling a given volume of starch-gluten mixture is much less, resulting in a great reduction in inventory. If tables were used, the material would be on them for 4 to 6 hr., whereas it is retained in a centrifuge for only about one minute.

The use of the De Laval dewatering centrifuges is also a new application. Conventional practice has been to use large settling tanks, with settling periods up to 24 hours. The rapid action of the centrifuges contributes to keeping the system fresh and minimizing bacterial growth.

Throughout the wet starch process, rates of flow, concentrations, temperatures and tank levels are controlled by instruments. Instrumentation of the Merco machines, in particular, is a departure from prior practice in that an effort was made to control completely automatically the operation of the machines with respect to feed supply rates, concentrations and water wash rates. Feed rates are governed by automatic flow controllers that maintain a constant feed tank level.

Attention can be devoted at this stage to the processing of the starch obtained from the second pass group of Merco centrifuges. Diluted with water, the product is filtered on two drum type, vacuum filters. Here, fresh water used for the first time in the entire starch plant processing is introduced as wash water. An intricately coordinated system of piping permits the multiple use and reuse of water that initially enters the processing at these filters. Throughout the starch plant processing, no water is sent to sewers. Water losses occur solely through evaporation where the steep water is evaporated to sirup, where the starch product is dried, or in the form of moisture in finished products.

Dried Starch Is Air-Conveyed

Washed starch cake from the filters is reslurried and pumped to the starch drying house or to the sugar refinery. Turning for the moment to the drying and bagging of starch, the slurry is dewatered, discharged over cleaners to remove any foreign matter, given an additional fresh water wash on two drum type string discharge filters and then passed through two traveling belt, continuous dryers heated by steam coils. The starch from the dryer is carried by means of a Fuller-Kenyon air pump to the packaging building for packing in 100 or 140 lb. bags. The product is weighed and packed with the use of a Merrifield scale, another new application for such service.

With respect to the Fuller-Kenyon pump system, the dried starch containing not over 12 to 14 percent moisture is moved from the dryer by means of a Redler elevator and discharged into a hopper. A motor-driven horizontal steel screw at the bottom of the hopper continuously carries the starch from the hopper and discharges the material into the larger end of a conical chamber. There, three air jets impel the incoming starch at an air pressure of 5 to 10 lb. to the smaller end of the chamber, where the mixture of air and starch is discharged into a 4-in. pipe and carried in the pipe to a receiving hopper at the packaging building. The vertical distance from the pump to the top of the hopper is approximately 75 ft. Very little starch is lost when the air is vented through a dust collector.

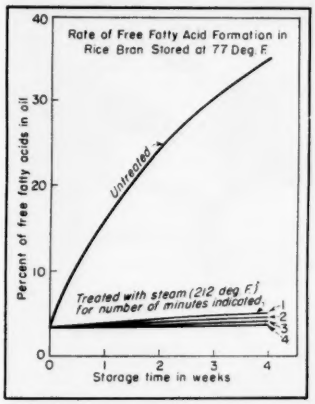
Starch Converted to Sugar

As to the conversion of starch to dextrose: That portion of the starch which is to be converted is taken in slurry form from the vacuum filters and is continuously and automatically acidified with sulphuric acid. The acidified product then moves to a continuous converter where, in the presence of steam, it is converted to a light dextrose sirup. Bentonite is added to the sirup to aid in the removal of residual fats and proteins. The bentonite, with these impurities, is removed by means of two Oliver precoat filters operating in parallel. The cake is discarded.

The continuous converter is the first such unit to be used on a commercial scale for the manufacture of dextrose sugar, although this is not true for the production of sirup. In the operation of the converter at the Bluebonnet plant a mixture of starch, dilute sulphuric acid and steam enters a chamber and then passes through 32 vertical copper tubes of 8-in. diameter connected in series. The tube assembly has a total length of 600 ft. Tubes are insulated with glass wool. The temperature in the system is about 320 deg. F. The material passes through the tubes and emerges after a total resident time of 12 min. Since the converter is continuous in operation the resident time for all starch that passes through it is constant, a fact that permits high efficiency in conversion.

(*Turn to page* 184)

Graph and Research Data Show How Fatty Acids Are Minimized



LIPASE ACTIVITY In Steam-Treated Freshly-Harvested Rice

Data are given in terms of ml. of 0.1 *N* sodium hydroxide required to neutralize fatty acids liberated under conditions of the test. Values for lipase activity are considered only semi-quantitative in view of variability of results.

Steam Treatment Temp. Deg. F.	Steam Treatment Time Min.	Lipase Activity[1] Of Bran, Ml.	Percent Free Acids In Oil of Brown Rice Stored at 77 Deg. F. Initial	2 Wk.	5 Wk.	8 Wk.	Percent Moisture Content of Brown Rice
		Procedure 1					
212	0	0.09	3.08	7.18	....	....	15.2
	1	0.00	1.71	1.70	....	....	12.9
	2	0.00	1.44	1.60	....	....	13.2
	3	0.01	1.52	1.59	....	....	13.1
	4	0.00	1.53	1.73	....	....	13.4
		Procedure 2					
212	0	1.30	2.99	5.72	7.38	9.59	13.9
	5	0.20	1.30	1.43	1.80	1.92	13.5
	15	0.30	1.64	1.62	1.92	2.22	13.4
200	5	0.30	1.41	1.45	1.62	2.00	13.6
	15	0.17	1.56	1.40	1.76	2.11	13.9
190	5	0.35	1.42	1.56	1.60	2.04	13.6
	15	0.45	1.47	1.50	1.75	2.03	13.7

[1]Lipase activity was determined by two different methods: Procedure 1—2 ml. of 10:1 aqueous extract of oil-free bran (corresponds to 200 mg. bran) were digested 1 hr. with 5 ml. of substrate consisting of 20g. of "Tween 20", 40 ml. M/15 phosphate buffer (pH 7.2), 20 ml. of 0.025 percent thymol blue solution and 20 ml. of water. Procedure 2—1g. of rice oil, 200 mg. of oil-free bran, 1 ml. of M/15 phosphate buffer (pH 7.2), 3 ml. of water, and 1 drop of toluene were agitated for 16 hr.

Steam Blanching of Fresh Rough Rice Curbs Spoilage by Fatty Acids

By inhibiting lipase activity, formation of acids is retarded. Then edible oil is easily recovered

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Investigations at the Western Regional Research Laboratory, Albany, Calif., have shown that lipase activity can be inhibited in undried rough rice by a simple procedure of steam blanching. It has been found that such treatments of rice, for as little as 1 min., can cause stabilization of the oil in rice bran (or brown rice) against fatty acid development, and allows recovery of high-grade edible oil.

Produced by current practices, rice bran is subject to rapid spoilage. This deterioration occurs in the oil fraction of the bran and consists in the formation of free fatty acids.

Fresh sound bran can be extracted with solvents to yield a pale oil which is stable and quite suitable for the manufacture of edible products. In contrast, oil recovered from spoiled bran is dark in color and costly to produce. The deleterious changes that take place in the bran also occur in brown rice, due to the bran layers on the surface of the rice kernel.

Development of free fatty acid in bran or brown rice is presumably due to a fat-splitting enzyme, inasmuch as it is retarded by heat treatment[1]. Lipase activity is easily demonstrable. For example, when unextracted bran or bran that had previously been extracted with petroleum ether was shaken with buffer solution and cottonseed or rice bran oil, there was small, but readily measurable, hydrolysis of the fat.

All samples of bran so far examined have shown extremely high counts of microorganisms. Whether these might furnish some or all of the lipase activity remains to be determined.

Exposure of bran to steam at 212 deg. F. for 1 min. (see graph) destroyed lipolytic activity. This observation suggested that similar treatment applied to rough rice as it comes from the field might be a useful procedure for stabilizing rice products. It would introduce no additional drying operations. And it might accomplish the vitamin enrichment that is now achieved by parboiling as suggested by Jones, Zeleny and Taylor[2].

In order to test this process, several batches of freshly harvested rice were subjected to steam treatment in a continuous blancher. The rice was then dried by procedures simulating commercial practice, and next hulled. Portions of brown rice were set aside for storage. Separate portions were milled to obtain the bran. This was extracted with petroleum ether and used for lipase assay (see table).

Results of this testing indicate clearly that short steam treatment of wet rough rice resulted in relatively stable bran and brown rice.

Preliminary milling tests have also indicated that the steam treatment achieves improved milling quality.

Jones *et al.*[3] previously had observed that parboiling produced kernel breakage. The color of the fully milled rice obtained from the treated material was acceptable. Crude oil extracted from the bran of treated rice was pale in color. Other aspects of steam-stabilized rice, including its nutritional qualities and texture when cooked, are being investigated.

References

1. A. P. West and A. O. Cruz. "Philippine Rice-Mill Products With Particular Reference to the Nutritive Value and Preservation of Rice Bran." *Philippine J. Sci.* 52, 55-57, 1933. C. A. Brown, Jr., "A Contribution To the Chemistry of Rice Oil.", *J. Am. Chem. Soc.* 25, 948-954, 1903.

2. J. W. Jones, L. Zeleny, and J. W. Taylor, "Effect of Parboiling and Related Treatments on the Milling, Nutritional and Cooking Quality of Rice." Circular No. 752, USDA, 1946.

Above article is based on the report, "Stabilization of Brown Rice and Rice Bran By Steam Treatment of Freshly Harvested Rice," which covered a study under the Research & Marketing Act of 1946.

Candies That Boosted Keeping-Quality Score

FONDANT PIECES—12-piece samples made up with various milk solids — were put up in dishes, as shown. Periodic weighings determined amount of moisture lost by evaporation. Maximum retention is essential for top quality.

Milk Solids Give Candies Longer-Lasting Freshness

Correct use of right dry milk ingredients aids confectioners in retaining moisture in fondants and thus prolonging their shelf-life

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Seven kinds of milk solids were recently studied to learn their values as ingredients for prolonging shelf-life in fondants, and it was found that—

They are highly beneficial as moisture-retaining ingredients.

They retain larger amounts of moisture initially present when the amount of solids is increased from 5 to 10 percent.

And the amount of moisture retained is influenced by the type of milk powder selected.

The dry ingredients employed were whole milk, skim milk, buttermilk, whey, cream, lactalbumin, and casein.

Although most dairy products are used by the candy industry because of their effect upon flavor and texture, storage tests made with fondants containing milk solids showed that moisture losses were less than those of fondants without milk solids. This observation indicates their importance in maintaining freshness and extending the shelf-life of candies.

It also reveals the need of quantitative data on moisture retention of the different milk products as an aid in the choice of the best milk solids for candies. Such data were not found in the literature.

Storage tests were carried out to determine: 1. Value of powdered milk products as moisture-retaining ingredients, 2. moisture-retaining values of different amounts of the products in candy, and 3. differences among the moisture-retaining values of individual products.

How Experiments Were Carried Out

To determine the value of these milk powders as moisture-retaining ingredients—where the milk product was the variable—a plain cream fondant containing sucrose, corn syrup, and water was used as the base (and control). To various samples of this base were added 5 or 10 percent of each powder.

The basic fondant was made and handled under uniform conditions, so that each batch had approximately the same initial moisture content. Each powder was added dry to the cooked fondant syrup (after cooling of the syrup to 90 deg. F.). Then the mixture was creamed, melted at 170 deg. F., and cast in rubber molds, where uniform size disks (½ in. x 1-1/16 in.) were formed.

When set, duplicate 12-piece samples (about 100g.) were weighed into tared glass dishes and stored at 70 deg. F. and 65 percent relative humidity. The disks were placed in a vertical position in the dishes—loosely to permit free circulation of air, as shown in photograph. Samples were weighed after 5, 10, 20 and 30 days to determine the amount of moisture lost at those intervals.

Because of unavoidable variations in the initial weight and moisture content of the samples, the amount of moisture lost was calculated as percent of solids. The less moisture lost by the fondant, the better the dairy product.

The initial moisture content of the candy was determined by macerating, with a table fork, duplicate 5-piece samples and drying them on sand in vacuo at 158 deg. F. The final moisture content of the stored candy was determined on duplicate 5-piece samples pulverized in a mortar and dried in vacuo as above. Duplicate lots of each batch of fondant and dairy products were included in the experiment. Results are seen in table (top of next page).

A comparison of the average amounts

* Mr. Fahs is a candymaker of the National Confectioners' Association.

of moisture lost in corresponding samples after 5, 10, 20 and 30 days' storage shows: 1. Greatest losses in control samples; and 2. least losses from pieces containing 10 percent milk powders.

There was a progressive loss of moisture throughout the storage period. A comparison of these losses shows that there is considerable variation among the individual products.

Assuming that slight unavoidable variations in the initial moisture content of the samples do not appreciably affect the total moisture lost, the results also indicate that the moisture-retaining value of individual products changes with respect to each other when the amount of powder is increased from 5 to 10 percent. An exception to this is lactalbumin, which showed the greatest moisture losses.

Despite variations in the initial moisture content of the samples, sufficient differences were noted between the moisture lost by control samples and those containing milk powders to assist in evaluating the products. In samples containing 5 percent powders, the minimum difference is 0.22 percent for lactalbumin. This is in contrast to the 1.46 percent maximum for buttermilk solids. Similar relationships are noted at the 10 percent level: 1.21 percent for lactalbumin and 2.23 percent for whole milk solids.

Lactalbumin, as stated, is the least capable of retaining moisture at both levels. Buttermilk solids and whole milk solids have the best moisture-retaining capacities at the 5 and 10 percent levels, respectively.

The average difference between all individual samples at the 5 and 10 percent levels and the control sample is 0.92 and 1.69 percent, respectively. Thus, there is an advantage in using these products at the higher level. An exception to this is casein which, when added to fondant at the higher level, increased its viscosity so much that it could not be cast into molds.

Checking the Results

Since the control is composed of carbohydrates, results indicate that the noncarbohydrate fraction of the milk powders is mainly responsible for moisture retention. The favorable moisture retention by highly purified soybean proteins, soybean flour, yeast, and mineral flour, indicated in similar unpublished tests, is further evidence that non-sugar solids are the primary moisture-retaining constituents.

From a standpoint of moisture retention, all of the products included in this study are beneficial at both 5 and 10 percent levels. However, their use is somewhat limited by their physical composition, flavor, and color.

As noted above, the addition of 10 percent casein to fondant changes its liquid consisteney to that of a heavy paste, making it impossible to cast it in molds. Also, whey solids possess considerable flavor and color, hence cannot be used to an advantage in white or mildly flavored goods.

Although the minimum amount of powders used in these experiments was 5 percent, still smaller amounts would undoubtedly show favorable results. This is apparent from comparison of the amount of moisture lost by individual products at both levels during the storage tests and noting that doubling the milk solids does not prevent corresponding losses of moisture.

One of the important factors governing the quality of candy is retention of its initial moisture content. This applies to both high- and low-moisture content candies, in which the initial moisture content is adjusted during manufacture to impart characteristic properties. Since moisture content controls many of the essential physical properties of candies, every possible effort should be made during their manufacture, handling, and storage to retain the optimum amount.

Small moisture gains, such as occur in low-moisture content hard candies, cause stickiness and are as detrimental to their quality as are moisture losses from fudge, marshmallow, and similar type candies which become hard when dry. Proper use of milk solids should aid in controlling moisture losses.

Buttermilk and Whole Milk Solids Do the Best Job

PERCENTAGE of Moisture Lost by Fondants, With and Without Powdered Milk Products

Product	Initial Moisture, Percent	Percent Moisture Lost On Solids, 5 Percent Powder Added				Initial Moisture	Percent Moisture Lost On Solids, 10 Percent Powder Added			
		Days' Storage					Days' Storage			
		5	10	20	30		5	10	20	30
Control	12.14	3.60	4.82	6.59	7.65	12.14	3.60	4.82	6.59	7.65
Whole milk solids	11.76*	3.20	4.31	5.85	6.73	10.90*	2.32	3.34	4.56	5.42
Nonfat solids	11.63	2.74	3.82	5.61	6.51	12.00	2.34	3.08	5.21	6.19
Whey	11.91	2.70	3.98	5.49	6.33	11.52	2.63	3.98	5.38	6.18
Buttermilk	11.33	2.39	3.76	5.30	6.19	11.51	2.20	3.46	4.97	5.80
Cream	12.06	2.79	4.29	5.99	6.76	11.16	2.49	3.24	5.12	5.78
Lactalbumin	12.03	3.51	4.56	6.41	7.43	11.51	2.93	3.61	5.46	6.44
Casein	12.06	2.88	4.16	6.00	6.91	N.S.**	N.S.	N.S.	N.S.	N.S.

* On solids basis. ** No sample.

The above article is from "Some Moisture-Retaining Properties of Fondant Containing Dry Milk Solids" Agricultural Chemical Research Division Contribution No. 245. The research was conducted under cooperative research project with the National Confectioners' Association.

Italy Strives for Food Comeback

Italian food processing is now slowly emerging from its wartime doldrums, but recent estimates indicate that it still has a long way to go before prewar output is reached.

Fruits and vegetables have always ranked high in the country's food preservation. But a scoresheet of four prime processing categories shows that only in popular tomato paste products has prewar output been regained (1947). Here are the figures in thousands of metric tons:

	1938	'46	'47	'48
Tomato paste	70	40	70	60
Canned tomatoes	81	20	25	38
Fruit preserves	39	31	30	30
Preserved vegetables	23	8	11	15

Lack of canning material has been the chief obstacle in the nation's effort to regain its prewar standing, particularly in foreign markets. Exports of fruit and vegetable preserves have been running at less than 25 percent since the war.

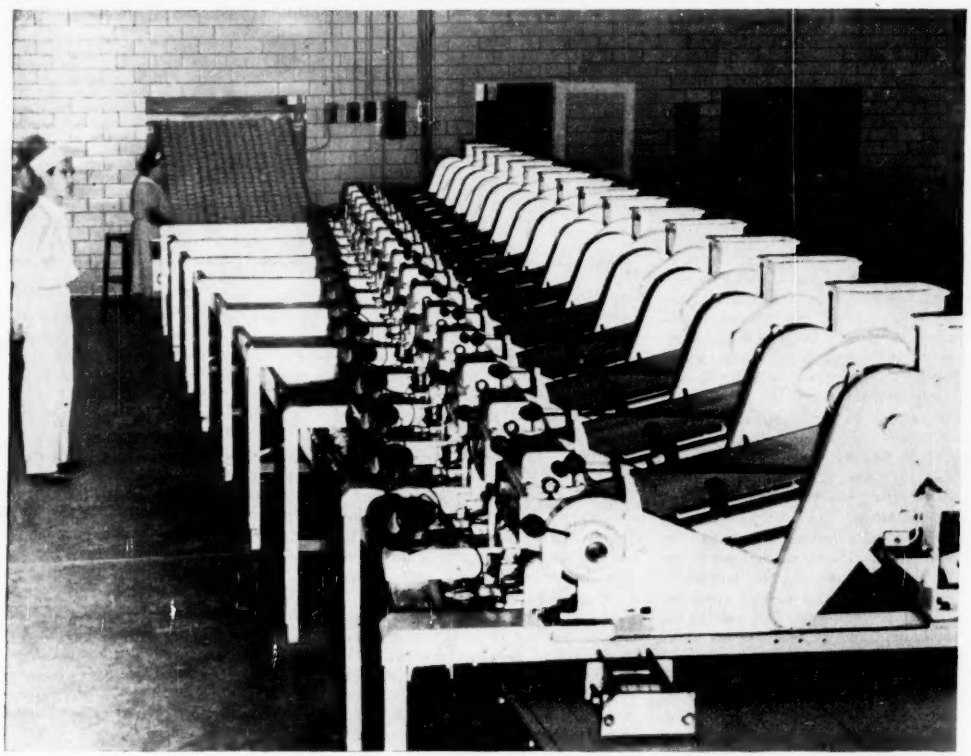
Fishery establishments, found all along the Italian coast suffered little material loss during the war. They were soon put in working order with annual total capacities of 30,000 tons of salted fish, 20,000 tons packed in oil, and 1,000 tons of pickled fish. Actual production, however, is lower.

With costs up about 80 times those of prewar while market prices were rising barely 35 times, the industry has had hard going. Despite these handicaps, output has been running at about 80 percent of prewar totals.

Meat packing has always been of secondary importance in the Italian food picture. While this industry did not suffer severe war losses, it appears that only about 30 to 40 percent of full potential is now being realized. Low consumer purchasing power, shortage of credit, and restrictions on imports of raw material are the main reasons for the slow recovery. Here, too, production and labor costs have increased many times over prewar.

One encouraging note appears in the fact that the meat packers have greatly improved their equipment. Export trade with Switzerland is now being revived, with packers also looking toward France and Egypt.

Heart of pretzel operation is this battery of dough twisters that . . .



1 ONE of the two line-ups of pretzel-tying units. A battery of 16 machines handles 800 pretzels a minute. Machines are fixed in diagonal position so rows of pretzels can be fed by inclined conveyor (rear) to caustic cooker.

Continuous Lines Multiply Output of Twisted Pretzels

Featured are automatic flour handling-weighing units, new dough-twisting machines, improved baking-drying ovens, and flexible packaging lines

JOHN V. ZIEMBA
Assistant Editor, "Food Industries"

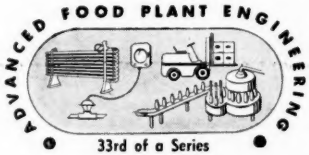
New profitable twists in pretzel production result from straightline flow at the recently constructed plant of Halter's Pretzels, Inc., Canton, Ohio.

Listed as one of the world's largest manufacturers of twisted pretzels, with a yearly output of over 3,500,000 lb., the new plant is now equipped to roll out a striking 9,000,000 lb.

This single-story brick-and-tile structure affords more than 22,000 sq. ft. of floor space. It houses two baking and drying ovens, 32 pretzel-tying machines, automatic flour-handling and weighing equipment, and over 1,000 ft. of conveyors.

"Noodle" rolls of pretzel dough are automatically looped by twisting machines. These dough rolls are supplied by mixers equipped with flour-handling and weighing units.

Leaving the twisting machines, pretzel dough goes to a conveyor transfer station, where it is put on a wire-mesh belt, then carried through a 1 percent hot caustic solution. Next, the dough is baked and dried in an oven, and finally packed in various unit sizes on the same packaging line.



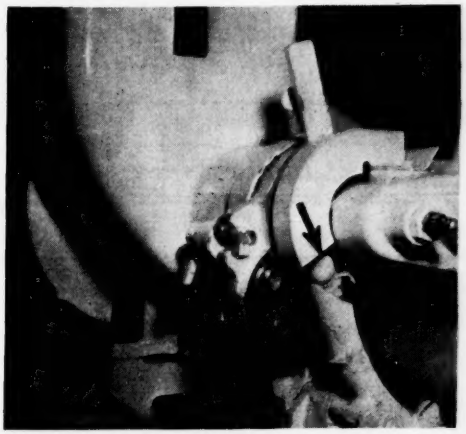
Keying the operations are two batteries of 16 pretzel-tying machines, recently redesigned by the American Machine & Foundry Co., N. Y. C. This machine, which has 400 working parts, took over 13 years to develop.

Pretzel Machine Saves Labor

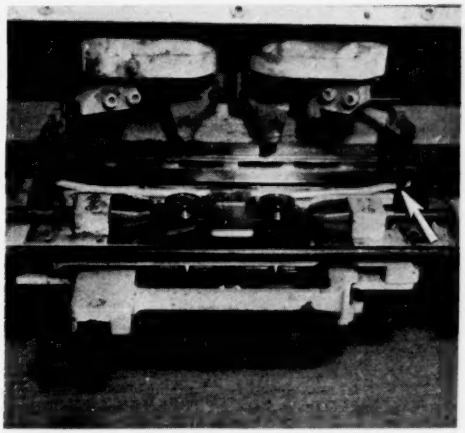
Only five operators are required to keep a battery of 16 pretzel tyers going—each machine tying knots in dough at the rate of 50 a minute. This is in contrast to more than 32 workers formerly needed to hand-twist the same amount of pretzels.

The present five jobs are: (1) Mix-

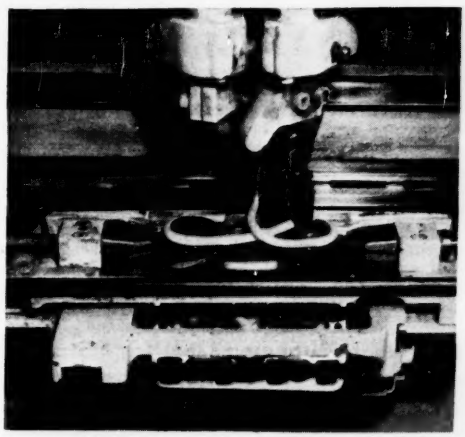
. . . work like this—



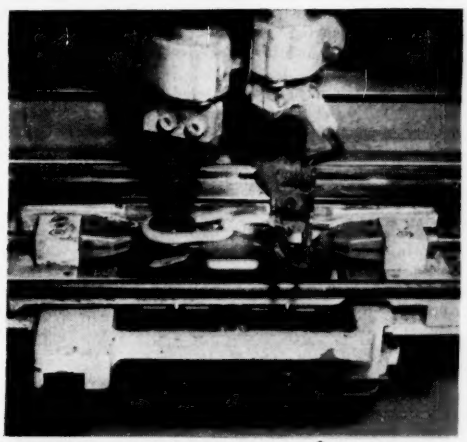
2 **FIRST** operation performed by machine is extrusion of dough from hopper (top) into 1-in.-dia. roll (arrow), which is guided by chute (lower, right) into molder.



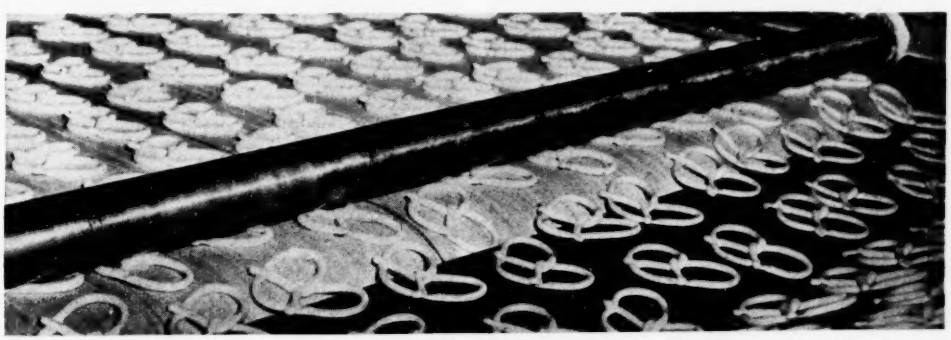
3 **AFTER** dough is formed into 11-in. noodle, two fingers grip each end. Here, fingers are set to twist pretzel. Arrow shows end of noodle gripped by finger.



4 **HALF-WAY** through twist, one gripper finger travels over dough held by other finger, to make a full loop. First finger then seals loop on top of dough.

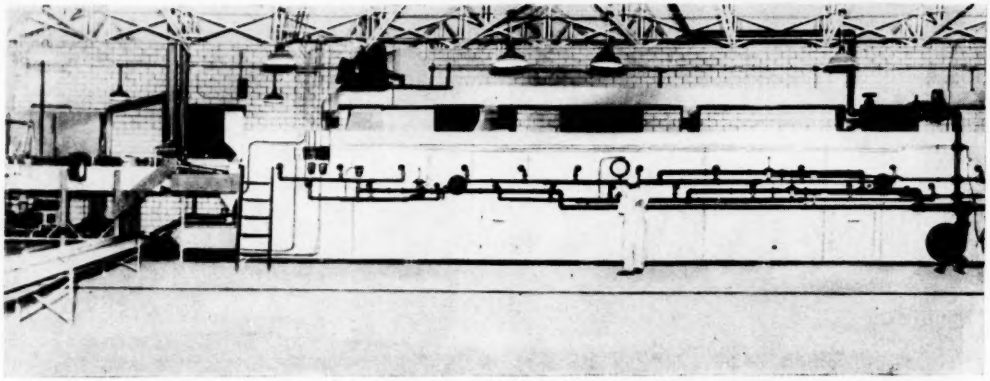


5 **OTHER** finger finishes second loop. Completely twisted pretzel will then be dropped on grid plate of conveyor below. Fingers are ready to twist next noodle.



6 **COMPLETED** pretzels, carried along conveyor, go under roller. Threaded pick-off rollers avoid "cripples" by transferring pretzels gently to wire-mesh conveyor leading to caustic cooker.

Lengthy Oven Both Bakes and Dries the Pretzels



THIS 94-ft. traveling oven handles over 43,000 pretzels an hour. By both baking and drying pretzels, instead of operations done separately, oven saves floor space. It dries pretzels with heat that former operations wasted.

ing the dough, (2) feeding dough into the hoppers of pretzel-tying machines, (3) tending to the machines and making mechanical adjustments when required, (4) removing "cripples" (imperfect pretzels), and (5) supervising production.

Machines are fixed directly over a 52-in.-wide canvas-belt conveyor. Each battery of machines is set up in a diagonal position so that 16 rows of twisted pretzel dough can be continuously fed to the cooker, salter, and oven.

From the 5th to the 16th machines, a ½-in.-thick sheet of Plexiglas is bolted to a steel framework, directly in front of the 12 units and above the conveyor. Built to support the weight of a man, this plastic top enables an operator to adjust machines that are not functioning properly without contaminating production already on the conveyor belt.

Units are numbered from 1 to 16 for two purposes: First, operators can quickly spot those machines that are tying cripples and thus make the necessary machine adjustments; and second, weekly records can be kept on the production of each machine to check its performance.

How Pretzel Twister Operates

Here is how the new pretzel-twisting machine turns out almost a pretzel a second:

A 20-lb. section of dough is placed in the hopper of the machine. The dough is carried by a worm screw that feeds it through an extruder. Here, the dough is formed into a 1-in.-dia. roll. A knife is timed to cut the roll of dough to proper length and deposit it through a chute onto the center of two molding boards.

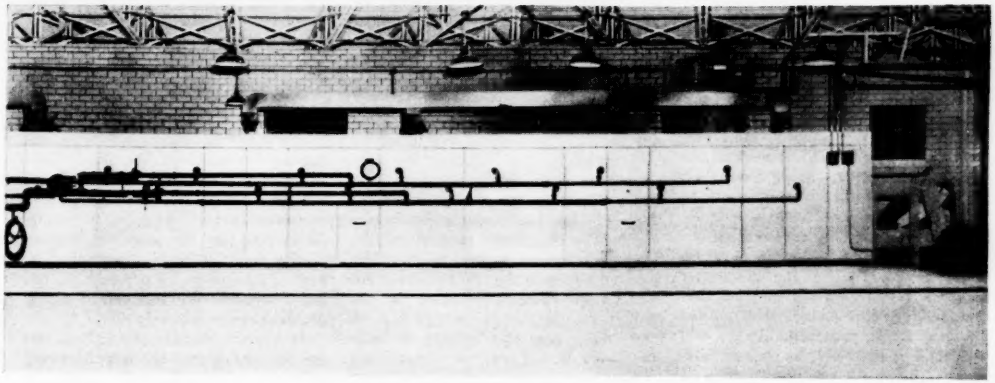
The top board is 23¼ in. long, and the bottom one is of 28⅞-in. length. Both boards have 18-in. traveling canvas belts. Surfaces of the belts contacting the dough run in opposite directions at the ratio of 15 to 12. The lower belt travels faster and in the direction of the tying mechanism. Top board is bow-shaped, and pressure from the board on the ball of dough can be adjusted so that the ball is

Wrapping Line Has 4 Stations

8 **CELLOPHANE BAGS** are packed to a net weight of 1 or 2 oz., then heat-sealed. This is Station 1.

9 **METAL CONTAINERS,** holding 12 oz., are filled at Station 2, together with 6-oz. cartons or trays.

Its Double-Duty Feature Saves Gas and Floor Space



rolled into a "noodle"—a strip of dough of ⅞ in. dia. and 14 in. long.

Coming from the molding boards, the noodle is deposited into a dough receiver, which is timed with the pellet cutting knife and tying head. The receiver delivers the noodle into one of the pockets of a long indexing roller, or "star wheel," by means of a transfer blade, which closes the gap between receiver and wheel.

The noodle is automatically deposited from the wheel into the knife-and-form-blade guides. Here, two gripper fingers straddle the top of the noodle. The fingers are automatically tripped by latches that rest on the star wheel.

When the fingers start a downward motion, they grip the dough. At the same time, the knives cut off excess dough, which is deposited onto a scrap belt. Both fingers make a forward circular motion, carrying the 11-in. noodle a distance of 4 in. to a center point.

To get out of the other's way, the left finger increases its speed and stops about 1 in. from the center of the form plate. Next, the right finger makes a full loop, traveling over the dough held by the left finger. Then, the right sealer finger makes a downward motion, sealing the end of the loop on top of the strip of dough forming the "back" of the pretzel. At the same time, the right gripper finger opens up to receive the next noodle. Then, this finger backs out of the path of the left one.

Now, the left finger finishes the second loop. It moves from the off-center to the center point, forming a tied and sealed knot of dough. And the left gripper finger opens to grip the next noodle.

Finally, the tied knot of dough drops onto a grid plate. A center plate and cones keep the pretzel dough from sliding off the plate and thus losing shape. The plate then revolves and deposits the pretzel dough onto the canvas conveyor belt.

"Non-Stick" Twisting

An electric blower, in front of each machine, keeps the dough noodle dry and prevents it from sticking to the equipment during the twisting operation.

Halter's devised special pick-off rollers to avoid the cripples that formerly occurred when the pretzel dough was transferred from one conveyor to another.

These rollers consist of ten revolving ¾-in. dia. threaded steel rods which are transverse of the conveyor. The

For Handling 10 Different Packages

10 **BULK PACKAGING** at Station 3. Either 5-lb. cartons or metal containers are put up.

11 **PRETZELS** are machine-weighed into 12 or 16-oz. cartons at Station 4. Cartons are then overwrapped.

rods are geared to transfer the 16 rows of pretzel dough gently from the slower moving canvas belt conveyor to the faster moving wire mesh conveyor that carries the dough to the cooker.

Caustic Cooker Redesigned

A noteworthy installation that permits continuous performance is the new pretzel cooker. Aside from that, it also assures more uniform quality.

Previously, considerable production time had been lost by replenishing the cooker three times a day with fresh caustic. Need for refilling the cooker with caustic comes from the fact that sodium hydroxide is absorbed by the pretzels during the cook. And a corresponding build-up in sodium carbonate causes the pretzels to take on a dull appearance.

To eliminate this costly caustic-refilling operation, the firm called upon engineers of Niagara Filter Co. for assistance.

This is how they solved the problem: Old caustic solution is now continuously pumped from the cooker into the filter. Here, lime is added from the lime-slurry tank by a high-pressure injection pump, working under 85 lb. pressure. The lime reacts with the excess sodium carbonate and forms soluble sodium hydroxide and insoluble calcium carbonate. The mix is then pumped through a pressure filter back to the cooker as fresh caustic.

The pretzel dough gets a 15-sec. cook in the 12-ft. long and 4-ft. 2-in. wide stainless-steel covered cooker, which is filled with mild caustic.

To keep the dough submerged in the caustic and give a uniform cook, the pretzel mix is carried between two wire mesh conveyors—below the surface of the caustic solution.

The caustic is heated to 200-205 deg. F. by a series of eight gas burners. Purpose of cooking the pretzels in caustic is to seal the dough and provide the pretzels with a gloss.

Leaving the cooker, the pretzels pass beneath an oversized salter, which runs the width of the conveyor. This unit salts the pretzels automatically. The salt is gravity-fed from a 600-lb. capacity hopper to an adjustable plate that regulates the feed to the brass corrugated salter drum.

It Bakes AND Dries

Striking baking performance has been achieved with two new 94-ft. traveling ovens. Designed by Bud Burris, company president, and Dan Pocci, plant superintendent, each oven handles 650 to 700 lb., or over 43,000 pretzels an hour.

In addition to volume baking, the ovens were designed to: (1) Economize on floor space, (2) put gas heat to double use, (3) cut down on gas consumption, and (4) safeguard against accidental fires.

Considerable floor space is saved by baking and drying pretzels in the same oven, instead of doing both operations separately and tying up double the space. The pretzels are baked as they travel the full length of the oven on a wire-mesh conveyor belt. At the end of the oven, the pretzels are transferred to another wire-mesh conveyor, located in the lower portion of the oven. Drying takes place as they are conveyed back to the front of the oven.

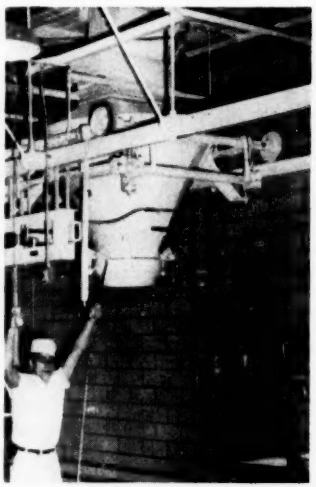
Another economy feature is the double-duty to which the gas heat is put. First, gas heat is used to bake the pretzels. Then, the remaining "waste heat" is recovered and employed to dry the pretzels.

Two 2-hp. electric-driven motor fans draw heat and steam from the baking area. One fan carries the steam away from the oven through an exhaust duct. The other draws the heat from the baking section through ducts into the dryer.

Big Gas Saving

Gas consumption has been cut in half. This saving has been accomplished by constructing the ovens with steel plates and using loose rock-wool insulation in place of brick-oven lining.

Installation of four fire doors at strategic areas in the dryer-portion of the oven makes it easier to fight a large fire, should one occur, and thus confine it in a small section of the oven.



12 THROUGHOUT plant, attention has been given to materials handling efficiency. Scale hopper (above) weighs flour and is rolled on overhead trolley to mixer. Meter (lower right)

Also, operators can inspect production going through the dryer and remove those pretzels that may have caught on fire.

The ovens each have 32 specially designed pressure-type burners. Each of these is equipped with individual gas-adjusting valves and pilot lights. Burners are of the ribbon-type, extending the width of the oven. Maximum combustion efficiency is assured through the use of air blowers and governors which properly proportion the air and gas. Through this proportioning and combustion arrangement, a maximum oven temperature of 600 deg. F. is accurately maintained during the baking process.

Automatic temperature instruments are used to control the color, texture, and size of the pretzels, which are affected by heat and humidity during the baking and drying operations. The thermostat, operating in conjunction with a motor-operated by-pass valve on the main gas line, automatically controls the oven temperature within close margins.

Gas burners are staggered above and below the conveyor carrying the pretzels through the baking section. In addition, burners are spaced farther apart toward the rear of the oven.

Positive maintenance of ventilation has been achieved by a damper ventilating system and an efficient motor-driven fan.

Pretzels are baked in 5 to 7 min. However, the baking time can be regulated by changing the speed of the conveyor in the baking section of the oven.

Flexibility Featured on Packing Line

Flexibility is an outstanding feature of the new pretzel-packaging line. Here, ten different packages can be put up at four stations.

At the first station, eight girls pack pretzels in cellophane bags, to a net weight of 1 or 2 oz. Or they handpack them in 4-lb. caddies.

Three different packages are put up at the second station. Pretzels are packed either in 12-oz. metal containers; or in 6-oz. cartons that are machine-wrapped and heat-sealed in cellophane; or in 6 oz.-cardboard trays which are automatically wrapped in cellophane. The number of girls packing at this station varies from two to four, depending upon the type of package.

At the third station, pretzels are bulk-packed in 5-lb. containers.

A conveyor elevates the pretzels into the hopper of an automatic filling machine at the fourth station. This machine weighs them into cartons—12-oz. or 1-lb. Cartons are closed and then travel to a machine that overwraps them with wax paper.

Extended Box—Ready for Continuous Heat-Processing

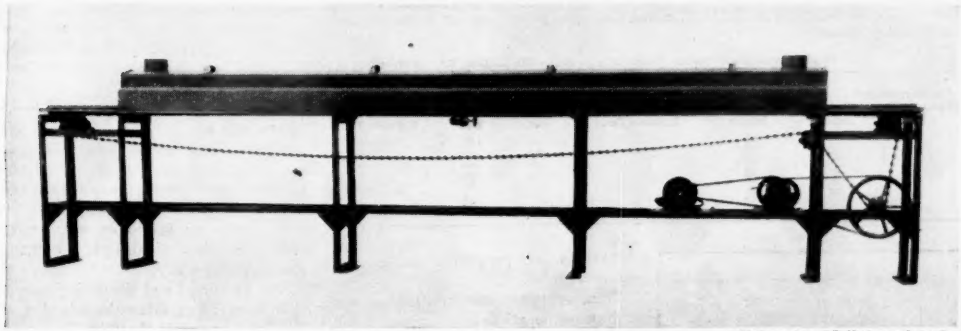


Photo courtesy of F. H. Langsenkamp Co.

INSTALLATION of this long steam box increased pickle production by changing the operation from batch to continuous. Moreover, no losses in flavor or crispness of cucumber pickles were entailed due to this innovation.

Exhaust Box Makes First-Class Pasteurizer

By merely lengthening it, this unit's been adapted as a highly efficient heat-processor for pickles—and now water baths aren't needed

MICHAEL J. ALTENBURGER and GEORGE HEROLD
Chemical Engineer and Assistant, respectively, P. Herold & Sons, Philadelphia

Savings in labor and equipment have been achieved in our plant by pasteurizing fresh cucumber pickles in an exhaust box. And we no longer need a continuous or batch-type water-bath pasteurizer.

Results of this new method of pasteurization, initially tried out during the July and August pickle season of 1948, indicated no losses in the flavor or crispness of pickles. And despite higher temperatures of the brine and the centers of pickles in jars pasteurized in the exhaust box, the heating cycle was much shorter than the conventional methods of pasteurization.

The exhaust box was already being used at P. Herold & Sons' Philadelphia plant as a pre-heater. And by lengthening the box, production was increased considerably, without the need to purchase additional water bath equipment. Furthermore, by lengthening the box, operations were changed from batch to continuous.

The steam exhaust box used was the conventional straight-line wooden type. Steam was supplied to it from perforated pipes, mounted on each side of the box. Different exhaust times were obtained by changing the sheave ratios in the driving unit, which in turn varied the speed of the belt. These different exhaust times were actually clocked several times to insure accuracy.

A word now about the method of packing employed during the experiment: The cucumbers were obtained directly from the growers, who picked them in the morning and hauled them to the receiving station. Here they were sorted according to size. Those cucumbers between 1⅛ and 1⅝ in. dia. were trucked from station to plant as soon as possible. At the plant, these sizes were soaked overnight in 30 deg. salometer (7.9 percent) salt brine.

Putting Up the Cucumbers

Next morning, the cucumbers were packed in quart jars. Then, the jars were conveyed to an overflow briner, where the cucumbers were covered with a brine made up of 1.6 percent acetic acid and 2.0 percent sodium chloride. The temperature of the brine was maintained thermostatically between 160 and 165 deg. F. At this stage, the cucumber pickle-heating cycle was started.

Immediately after leaving the briner, the jars entered the exhaust box. The temperature near the entrance end of the box—the cooler end—was kept at 210 deg. F. Except when experimental data were being collected, the speed of the belt was maintained at a constant rate. The belt speed had been set to raise the temperature of the brine in the jars to about 150 deg. F. by the time the jars left the exhauster and were capped. This temperature was sufficient to form a vacuum after pasteurization and cooling—the original purpose of the exhaust box.

After the jars were capped they were washed and placed in metal baskets that were carried to retorts for pasteurization. The jars were finally labeled after a rapid cooling.

Since there is little information on the temperatures required to pasteurize fresh whole or sliced cucumber pickles —because of variables such as acidity, salinity, size of pickle, and size of container—it was decided that the contents of the jars must accordingly, be heated to 165 deg. F. for varying periods. It was assumed that the highest pickle-center temperature necessary for pasteurization was 165 deg. F. Yet to be determined was the lowest temperature to pasteurize pickles satisfactorily.

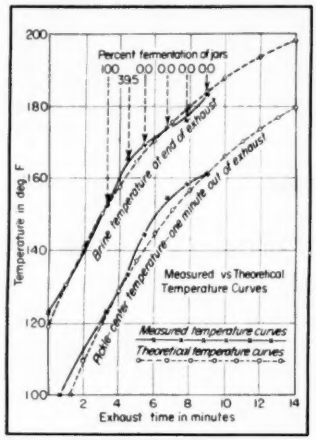
Lag in Pickle-Center Temperature

With this in mind, measurements of pickle-center temperatures were made in the laboratory during the spring of 1948. As far as possible, conditions simulated those on the production line. From this investigation, two things were learned about the pickle-center temperature: 1. It lagged 20 to 30 deg. F. behind the temperature of the brine during the heating cycle; and 2. it continued to rise 15 to 20 deg. F. after the jars emerged from the exhaust box, next were air-cooled 1 min. (to allow time for capping and transfer operations), and

How Box Cuts Time of Pasteurization

EFFECT OF DIFFERENT Exhaust Times on Average Pickle-Center and Brine Temperatures Before and After Exhaust-Box Pasteurization of Brine-Packed Cucumber Pickles

Pasteurization (Exhaust Time, Min.)	Pickle-Center Temperature (Deg. F.)			Brine Temp. (Deg. F.)		Percentage of Fermented Samples of Total Saved From Each Exhaust Time
	Before Brining	1 Min. After Emerging From Briner	1 Min. After Emerging From Exhaust Box	Between Briner and Exhaust Box	Leaving Exhaust Box	
3.3	75	90	123	121	152	100.0
4.5	75	92	133	125	165	39.5
5.4	75	95	144	125	169	0.0
6.7	75	92	154	120	174	0.0
7.8	75	92	158	127	176	0.0
9.0	75	95	161	121	183	0.0



then immediately cooled with water.

From this data, it was decided that quart jars should leave the exhaust box with the brine about 165 deg. F. At this stage, the pickle-center temperature would be about 140 to 145 deg. F. It was expected that the final pickle-center temperature would reach 155 to 165 deg. F.

Previous data from the exhaust box indicated that a 165-deg.-F. brine temperature required about a 5-min. heating cycle. However, provisions were made to vary the runs through the box in order to collect samples and temperature data for the measured and calculated curves.

How Tests Were Made

Work during the packing season proceeded two ways: First, samples were selected as they traveled through the washer during the different exhaust periods. These samples were immediately cooled, stored, and then observed at intervals for signs of fermentation. A dozen samples were gathered daily during each exhaust period.

Second, complete data were obtained daily of the brine and pickle-center temperatures during the different exhaust periods. The data were averaged and used for calculating the equations for preparing curves (see chart at left).

Temperatures were recorded at the following locations:

1. Brine as the jar traveled between the briner and the entrance to the exhaust box. A jar was collected as it emerged from the briner. Then, a thermometer was placed as near as possible to the jar center, and another thermometer was put at the side of the jar at a point about 2 in. from the bottom. These positions were selected to obtain an average temperature near the coolest portion of the jar. When the temperatures became nearly stationary, readings were recorded. At this time, the brine had been cooled to a minimum by the pickles only, since the room temperature had not had time to cause any appreciable difference.

2. Brine after jars emerged from the exhaust box. In this case, the same procedure was followed as for (1).

3. Pickle-center between briner and exhaust box. Because of the time required to remove a pickle from the bottom and center of the jar, to insert the thermometer in the sample, and to make the readings, it was decided to note the temperature 1 min. after the jar left the briner.

4. Pickle-centers after the jars emerged from the exhaust box. The same procedure was followed as for (3).

In all cases, the pickle-center temperature before the brining operation was 75 deg. F.

Samples collected during the packing season were stored at 70 deg. F. and checked each week for signs of fermentation. This check was discontinued after six months, since spoilage was not observed during the last four months.

Takes Only a Few Minutes

Although these experiments were conducted with quart jars, the exhaust box can also be used to pasteurize pickles put up in smaller jars and tin cans.

The experiment showed that fresh cucumber pickles can be pasteurized in an exhaust box in 5.4 min. This time is the minimum for signs of fermentation and for the required temperature points selected from the theoretical curve. However, 1 min. should be added to this time as a precautionary measure.

Temperatures to which the brine and pickle-centers were heated in the various exhaust periods had little effect upon the crispness or flavor of the pickles. Furthermore the crispness and flavor of exhaust-pasteurized pickles compared very favorably with water bath-pasteurized pickles put up during the regular pack.

The measured and theoretical curves that were drawn allow the selection of desired end-points (within the conditions of the experiments).

Spoilage, as evidenced by signs of fermentation, was never apparent in the samples before 6 days. And no spoilage was found after 26 days of storage.

Further Research Indicated

It is seen desirable to repeat this experiment by capping the jars preceding the last half of the run through the exhaust box, for the following reasons:

1. Uncapped runs through the exhaust box result in an expansion of the brine which, upon cooling, produces a low liquid level in the jars. While these levels produced during the experiment were acceptable commercially, a higher level of pickle brine is desirable.

2. Because of the high temperature of the brine in the exhaust box, some spice oils may volatilize from uncapped jars. The extent of volatilization will depend upon the concentration and the type of spice oil used.

3. If a 7-min. exhaust were divided into a 2-min. and 5-min. pass, with the capping operation performed between them, a higher liquid level would result and sufficient vacuum would be maintained in the container. More important, the pickle-center temperature would continue to rise during the capping operation, while the temperature of the brine would not rise. This system would provide an additional safety factor, without the brine being heated excessively or the pickles losing their quality.

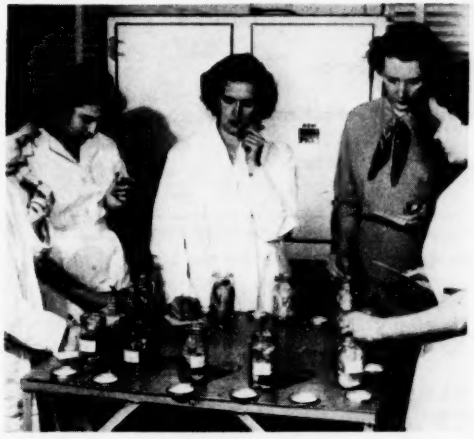
It must be noted, however, that the type of closure that is used may not permit the use of the split-exhaust technic in all cases.

Acknowledgment

The authors wish to thank Frank Glabbatz, produce manager, P. Herold & Sons, for his cooperation during the period data was collected for this article.

Light impairs the chips' quality, while darkness helps protect it

DETERIORATION of chips is greatly accelerated in cabinet lighted by fluorescent tube.



BUT TASTE PANEL found quality good after dark-cabinet storage at 100 deg. F.

Proper packaging is big factor in keeping them crisp

PACKAGING materials vary in maintaining crispness. Some bags kept product fresh 164 hr.

MOISTURE that chips absorb through various type bags is carefully gaged in laboratory tests.

Potato Chips vs. Hot-Weather Spoilage

Maximum protection is seen for this popular summer item—by using stable fats and oils, moisture-proof containers, and shielding against light

J. H. MITCHELL, JR.

Head of Biochemistry Section,
Southern Research Institute, Birmingham, Ala.

During summer months, many potato chip makers find that their products do not "hold up" on retailers' shelves. With the coming of hot, humid weather, the customer complaints are heard: "The chips aren't crisp," "They taste rancid," or "I don't like their odor, and the flavor's bad."

For the best interests of the consumer as well as for the industry—whose annual sales are close to $250,000,000—it is important that such detrimental changes in the chips be minimized.

In a program conducted for the National Potato Chip Institute, investigations at Southern Research Institute, Birmingham, Ala., have been directed toward isolation of the vari-

Tests supplied basic data on stability, flavor, moisture protection, and light effects

TABLE I—Stability of Potato Chips, Prepared In Various Fresh Fats and Oils (Non-Continuous Frying), After Three Weeks Storage Under Differing Conditions

Oil	Chips Stored at 100 Deg. F. In Dark Cabinet		Chips Stored at 70–75 Deg. F. In a North Window	
	Flavor Score	Peroxide Value	Flavor Score	Peroxide Value
Peanut	94	3.63	100	6.17
Cottonseed	95	9.25	87	9.25
Coconut	98	1.22	100	3.08
Corn	94	4.93	75	6.79
Soybean	41	....	8	....
Lard	0	67.90	18	....
Hydro. Veg. Oil "A"	72	1.21	48	1.85
Hydro. Veg. Oil "B"	100	....	95	....
Hydro. Veg. Oil "C"	95	....	95	....

TABLE II—Flavor Scores of Potato Chips Prepared by Continuous Frying, After Storage Under Differing Conditions

Storage in Dark Cabinet at 100 Deg. F.

	Hydrog. Veg. Oil "B" Weeks					Cottonseed Oil Weeks				50% Cottonseed—50% Hydrog. Veg. Oil "B Weeks				
Sample	1	2	3	4	Avg.	2	3	4	Avg.	1	2	3	4	Avg.
1	96	97	100	95	97	95	100	90	95	92	94	95	95	94
2	..	92	100	98	96	100	100	83	94	93	90	92	95	92
3	95	95	100	95	96	100	90	76	88	67	72	86	90	78
4	87	92	100	90	92	95	90	63	82	80	87	76	87	82
Avg.	92	94	100	94	95	97	95	78	90	83	86	87	92	87

Storage in Light Cabinet at 100 Deg. F.

	Hydrog. Veg. Oil "B" Weeks				Cottonseed Oil Weeks				50% Cottonseed—50% Hydrog. Veg. Oil "B" Weeks				
Sample	1	3	4	Avg.	1	3	4	Avg.	1	2	3	4	Avg.
1	100	100	100	100	90	90	0	60	100	100	90	90	95
2	90	100	100	96	50	50	0	33	100	100	50	0	62
3	90	90	90	90	50	50	0	33	90	90	0	0	45
4	70	90	90	83	50	50	0	33	70	70	0	0	35
Avg.	87	95	95	92	60	60	0	40	90	90	35	22	59

Storage in Diffused Daylight at 72 Deg. F.

	Hydrog. Veg. Oil "B" Weeks				Cottonseed Oil Weeks				50% Cottonseed—50% Hydrog. Veg. Oil "B" Weeks				
Sample	1	3	4	Avg.	1	3	4	Avg.	1	2	3	4	Avg.
1	100	90	90	93	100	90	70	87	100	100	90	70	90
2	100	90	90	93	90	90	70	83	100	100	90	70	90
3	100	100	90	97	90	70	70	76	100	100	90	70	90
4	90	100	90	93	90	90	70	83	100	100	90	70	90
Avg.	97	95	90	94	92	85	70	82	100	100	90	70	90

ous factors responsible for these harmful effects and toward solving the difficulties.

At the beginning of the program, a questionnaire was distributed to all members of the potato chip organization. These queries were for the purpose of obtaining from the manufacturers summations of their difficulties and specific experiences—for use as references in our laboratory's attack on the problems. Of 44 members answering the questionnaire—

43 had encountered more rapid deterioration of chips during summer than during the winter.

20 referred to difficulty due to both rancidity and loss of crispness.

15 observed, principally, a loss of crispness, and

8 complained chiefly of rancidity.

Several of the factors commonly assumed to affect shelf life of potato chips are: Fats used in frying,[1] light, moisture absorption, and additions of antioxidants. In this program studies were made of the keeping quality of chips as affected by the type of frying fat or oil, by light transmission through various types of paper, and by moisture uptake in bags constructed of materials of various specifications. The effect of addition of antioxidants to the fat received some investigation, but here further tests are needed before drawing definite conclusions.

Results of these studies showed conclusively that potato chips can be maintained in a palatable condition for more than four weeks—under conditions which accelerate deterioration—*if* the maker uses the most stable fats and oils, the most moisture-proof containers, and provides protection against light.

However, when prepared in unstable oils or fats, or without getting proper protection from moisture and light, chips might remain edible for only a few days.

Method of Testing

In studying the effect of fats and oils, potatoes were obtained from a producer of potato chips, and were thus of the same quality used for commercial processing. These tubers were sliced in our laboratory, washed, and soaked in water at about 60 deg. F. for 30 min., then fried at approximately 375 deg. F. in fat or oil contained in porcelain-lined vessels. In certain continuous frying tests, to determine the stability of chips prepared in oil kept for several hours at high temperatures, additional fat was added as required to replace that absorbed by the chips.

After draining for about ten minutes, the chips were packed in pint glass jars for storage. At the end of selected storage periods—in a dark cabinet at 100 deg. F., in a light cabinet at 100 deg. F. (about 125 foot-candles), or at room temperature in diffused daylight (about 250 foot-candles)—taste tests were conducted by a panel of five to seven persons.

Comments (expressed as numerical values) were limited to flavor and odor of the chips. Average score for each sample was found, in the usual manner, by dividing the sum of the numerical values for each sample by the number of tasters. The comments employed and their numerical values were as follows: Fresh 100; Slightly stale 90; Stale 70; Slightly rancid 50; Rancid 0; and Peculiar 0.

Peroxide values,[2] were determined on some of the chips. However, it was concluded that taste tests furnish a much more reliable indication of

[1] King, Florence B.; Laughlin, Rosemary; Riemenschneider, R. W.; and Ellis, M. R., *Journal of Agricultural Research* 53, No. 5, 369-81 (1936).

[2] Wheeler, D. H., *Oil and Soap* 9, 89-97 (1932).

TABLE III—Moisture Protection Given Potato Chips by Various Types of Bags (Temperature 100 Deg. F., 95 Percent Relative Humidity)

Bag Specification	Method of Sealing	Length of Test Hr.	Flavor	Physical Condition Of Chips
Duplex 300 MST-52x300 MST-53 cellophane	Folded and stapled twice	24	o.k.	Crisp
		48	o.k.	Crisp
		96	o.k.	Crisp
		164	o.k.	Crisp
120 N-2 Pliofilm	Folded and stapled twice	24	o.k.	Crisp
		48	o.k.	Crisp
		96	poor	Slightly limp
		164	poor	Limp
30-lb. Glassine waxed to 33 lb.	Folded and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	poor	Limp
		164	poor	Limp
Duplex. Two sheets 25 lb. Glassine waxed to 28 lb.	Folded and stapled twice	24	o.k.	Crisp
		48	o.k.	Crisp
		96	o.k.	Crisp
		164	o.k.	Crisp
Duplex. Two sheets 25 lb. Glassine waxed to 28 lb.	Folded one time and stapled in the center	24	o.k.	Crisp
		48	o.k.	Crisp
		96	o.k.	Crisp
		164	o.k.	Crisp
Duplex. Inner sheet of 22-lb. Diafane coated to 25 lb. Outer sheet 300 lb. MST cellophane	Folded twice and stapled twice	24	o.k.	Crisp
		48	o.k.	Crisp
		96	fair	Very slightly limp
		164	fair	Very slightly limp
56-lb. Laminated DHS-D coated Kleerview Glassine	Folded twice and stapled twice	24	o.k.	Crisp
		48	o.k.	Crisp
		96	fair	Very slightly limp
		164	fair	Very slightly limp
Duplex Diafane nitrocellulose coated	Folded twice and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	poor	Slightly limp
		164	poor	Limp
0.00035 Gage aluminum mounted to grease-proof Glassine	Folded twice and stapled twice	24	o.k.	Crisp
		48	o.k.	Crisp
		96	o.k.	Crisp
		164	poor	Slightly limp
0.00035 Gage aluminum mounted to No. 673 Rapinwax thermoplastic coated on sides	Folded twice and stapled	24	o.k.	Crisp
		48	o.k.	Crisp
0.00035 Gage aluminum mounted to No. 673 Rapinwax thermoplastic coated on sides	Folded twice and stapled twice	96	o.k.	Crisp
		164	o.k.	Crisp
300x300 MST-54 cellophane. Duplex	Folded twice and stapled twice	24	o.k.	Crisp
		48	o.k.	Crisp
		96	o.k.	Crisp
		164	o.k.	Crisp
57 DSH (C-25) Kleerview laminated Glassine	Folded twice and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	fair	Very slightly limp
		164	fair	Very slightly limp
600 Tritect	Folded twice and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	fair	Very slightly limp
		164	fair	Very slightly limp
30-lb. Glassine waxed two sides	Folded twice and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	fair	Very slightly limp
		164	poor	Slightly limp
40-lb. Glassine waxed two sides	Folded twice and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	fair	Very slightly limp
		164	poor	Limp
54-lb. DSH lacquer-coated waxed laminated Glassine	Folded twice and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	fair	Very slightly limp
		164	fair	Very slightly limp
30-lb. Glassine 3 lb. wax sheet	Folded twice and stapled twice	24	fair	Very slightly limp
		48	poor	Limp
		96	poor	Limp
		164	poor	Limp
450 MST-54 cellophane	Folded twice and stapled twice	24	o.k.	Crisp
		48	fair	Very slightly limp
		96	fair	Very slightly limp
		164	poor	Limp
47-lb. Laminated bleached Glassine	Folded twice and stapled twice	24	fair	Very slightly limp
		48	fair	Very slightly limp
		96	poor	Slightly limp
		164	poor	Limp

TABLE IV—Effects on Potato Chip Shelf Life of Excluding Light of Certain Wave Lengths vs. Excluding All Light

Designation of Bag	Section A: 1-Week Test at 100 Deg. F. Place of Storage	Flavor Score	Score in Dark Minus Score in Light	Section B: 2-Weeks Test at 70–80 Deg. F. Place of Storage	Flavor Score After 2 Weeks	Score in Dark Minus Score in Light
Yellow duplex 300 MSRC X 300 MST-53 cellophane	light cabinet	39	55	north window	50	48
	dark cabinet	94		dark cabinet	98	
27-lb. unwaxed Glassine (no color)	light cabinet	23	47	north window	31	51
	dark cabinet	70		dark cabinet	82	
27-lb. green unwaxed Glassine ("Rile-Coe")	light cabinet	96	4	north window	77	10
	dark cabinet	100		dark cabinet	87	
28 lb. double-waxed Glassine (no color)	light cabinet	24	55	north window	62	34
	dark cabinet	79		dark cabinet	96	
30-lb. double-waxed green Glassine ("Rile-Coe")	light cabinet	86	1	north window	61	20
	dark cabinet	85		dark cabinet	81	
Laminated 25 x 27 lb. green Glassine ("Rile-Coe")	light cabinet	86	8	north window	73	23
	dark cabinet	94		dark cabinet	96	
Difference between average score in dark and in light for colorless bags			51			42
Difference between average score in dark and in light for green bags			4			18
Average of scores in light for colorless bags			24			46
Average of scores in light for green bags			89			70
Average of scores in dark			87			90

flavor acceptability in potato chips than do the peroxide values.

In preliminary trials, potato chips were taken for storage after being fried in fresh fat or oil. Selected examples of the more stable fats were then used in continuous frying experiments over a six-hour period.

In Table I are given some results obtained by frying chips in fresh fats and oils on a non-continuous basis.

Considering the storage in light and dark, vegetable oils gave results which placed them in the following order with regard to stability: 1. Coconut oil; 2. peanut oil, cottonseed oil; 3. corn oil; and 4. soybean oil.

It is merely a matter of general interest that coconut oil is included, since it foams badly in deep fat frying of potato chips and is not used for foods of high moisture content.

Hydrogenated vegetable oils varied widely in their stability. Sample "A" is a general purpose blend which showed very poor stability. Several unusual flavors, described as "sweet"

or "soapy," developed in chips fried in this shortening, which rendered them quite as unacceptable as would rancidity. Hydrogenated vegetable oil samples "B" and "C", however, gave chips with flavor scores as high, at three weeks, as any oil or fat used. These two samples were examples of types recommended by manufacturers for deep fat frying. They were purchased on the open market.

Inasmuch as all these tests were conducted with samples of fresh fat, not subjected to long periods of high temperature, some of the runs were repeated in a manner designed to reproduce commercial frying operations. The oil was kept at approximately 375 deg. F. over a 6-hr. period and chips were fried continuously. Samples were taken at intervals for storage. These tests were made with hydrogenated oil "B" and cottonseed oil, which were found, in the preliminary trials, to be the most stable.

In Table II are given the results of taste tests conducted over a four-week period with these fats. Sample 1 was taken at the beginning of the frying operation; Sample 2 after 2 hr.; Sample 3 after 4 hr.; and Sample 4 after 6 hr. It will be observed (Table II) that after storage for four weeks at 100 deg. F. in the dark, samples of chips taken at 4 and 6 hr. from cottonseed oil did not hold up quite as well as those produced in the hydrogenated vegetable oil.

Duplicates of these samples were stored in a cabinet at 100 deg. F., lighted by a fluorescent tube, and it is obvious (Table III) that under these conditions chips produced in the hydrogenated vegetable oil kept very much better than those produced in cottonseed oil.

Duplicate samples stored in diffused daylight at room temperature (72 deg. F.) again showed that better keeping qualities were obtained with the hydrogenated vegetable oil.

Packaging Investigation

Proper packaging of potato chips is extremely important if they are to be kept in a crisp and palatable condition. Since unprotected chips rapidly absorb moisture—the rate depending upon the relative humidity—a number of packaging materials were used in accelerated tests to determine their relative efficiency in excluding moisture vapor.

The potato chips used in these tests were obtained fresh from a commercial source and all were prepared from the same lot of potatoes and fried in the same oil.

The bags were supplied by a number of manufacturers. All were of approximately 6x10-in. size.

Into each bag was placed 35g. of potato chips, duplicate samples being prepared in each case. The bags were placed in a cabinet thermostatically controlled at 100 deg. F. and maintained at 95 percent relative humidity. Circulation through the cabinet was aided by means of a small electric fan, and the bags were spaced to allow free circulation of air between them.

Containers were opened after 24, 48, 96, and 164 hr. and the chips were then examined by inspection and tasting to determine where they stood in the range from crispness to limpness. Analyses for water were made on examples of chips in each of these classifications (see Table III).

Analyses for water showed that chips immediately after frying contained about 1.5 percent moisture. Chips which were still fairly crisp after storage at high humidity contained 2.8 percent water, while chips which were very slightly limp contained 3.2 percent, and those which were limp contained 8.2 percent water.

After 164 hr., chips in bags of duplex waxed glassine, duplex 300 X 300 MST-54 cellophane, duplex 300 MST-54 X 300 MST-53 cellophane, and in foil laminated to glassine or Rapinwax were still crisp. In a two-week test at 100 deg. F. and 95 percent relative humidity, it was also found that chips stored in duplex waxed glassine bags were kept as crisp when the seal was made by folding and stapling as when it was made by heat sealing.

Light Exclusion

Light is responsible for a photochemical action on fatty foods, resulting in flavor reversion and rancidity. This action has been stated by some investigators to be more pronounced at some wave lengths than others. However, others have concluded that the depth of color is of more importance than the actual tint. In order to evaluate several types of paper with respect to the effect of each on the keeping quality of potato chips, tests were conducted in the dark and in the light in bags made of these materials.

As before, potato chips used in these tests were obtained from a commercial manufacturer, and the bags were supplied by several companies and were all of approximate 6x10 in. size (bags are identified in Table IV).

Four bags of each type were filled with 35g. of potato chips. All were folded twice and stapled twice. One bag of each kind was placed in a cabinet maintained at 100 deg. F. and lighted with one 14w. fluorescent tube, the light intensity being about 125 foot-candles. A duplicate bag of each type was placed in a dark cabinet maintained at 100 deg. F.

After one week, taste tests were conducted on all of these samples by a panel of eight persons, and the chips were rated on the basis of flavor, according to the system previously described.

Green vs. Yellow and Colorless

In addition to the tests at 100 deg. F., one sample of each type was placed (at room temperature, 70 to 72 deg. F.) in a north window where the light intensity averaged about 250 foot-candles during the day, while the control samples were kept in a dark cabinet. After two weeks, taste tests were made, as already described.

In Table IV, Section A, note that there was less change in flavor of chips which were stored in green bags than in those stored in colorless or yellow cellophane bags. The difference between the average score in the dark and in the light for samples stored in green bags in light and dark is 4.0, while this average is 51 for the colorless and 55 for the yellow cellophane bags.

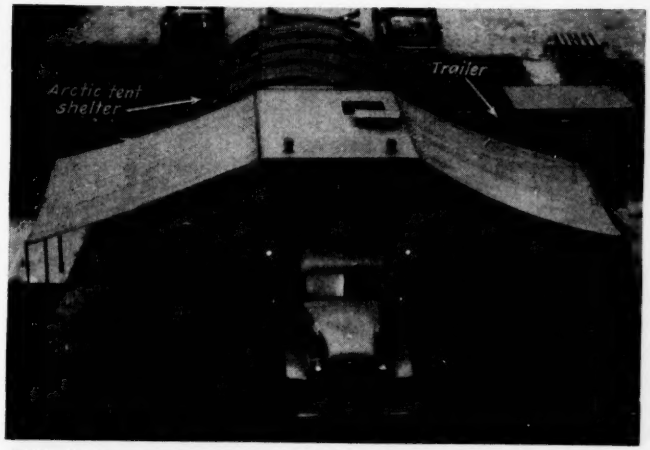
The average of the scores for samples stored in green bags in light is 89, which may be compared to a score of 24 for samples stored in colorless and 39 in yellow cellophane bags in light. The average of the scores for all samples stored in the dark is 87. These results indicate that under conditions of mild illumination, storage in the green bags was about as effective in preventing the deleterious action of light as storage in the absence of all light.

Results reported in Section B of the table were obtained under daylight-hour illumination of higher intensity than that used in obtaining the results in Section A.

The difference between the average score in the dark and in the light for samples stored in green bags in light and dark is 18, while this average is 42 for colorless and 48 for yellow cellophane bags.

Average of the score for samples stored in green bags in daylight is 70, compared to a score of 46 for samples stored in colorless and 50 in yellow cellophane bags. The average of the scores for all samples stored in dark is 90.

It is seen that under conditions of higher illumination and lower temperature than were used in the 100 deg. F. cabinet test, samples stored in green bags gave a higher score than those stored in colorless, opaque white, or yellow bags. However, samples stored in the absence of all light possessed a higher flavor score than samples stored in green bags. At high light intensities—out of doors or close to a window—containers such as foil bags, cans, or cardboard boxes would exclude practically all light and thus give maximum protection.



With little room for storage, QMC had to get comparisons on . . .

Soluble Coffee for Mobile Kitchens

Study* provides contrasts with freshly roasted coffee that are significant to coffee industry

WILBUR L. duBOIS and WILLIAM C. WINOKUR

Quartermaster Food & Container Institute for the Armed Forces, Chicago

Development of the new mobile kitchen by the Office of the Quartermaster General means restricted storage space for supplies and need for food packages compact in size and light in weight.

In this connection, the Quartermaster Food & Container Institute was asked to compare soluble coffee with ground freshly roasted coffee, vacuum-packed in tins. The study involves answers to the following questions:

1. Will there be sufficient production of soluble coffee during a national emergency to supply the mobile kitchens in addition to other Army requirements?
2. What is the cost of soluble coffee in relation to that of ground, freshly roasted coffee?
3. What is the saving in space and weight if soluble coffee be used exclusively?
4. What are the comparative utility values of the two types of coffee?
5. Do military personnel like soluble coffee well enough to justify its substitution for ground, roasted coffee for mobile-kitchen use?

Two types of soluble coffee powder were used during World War II. One was obtained by drying a hot-water brew of ground coffee. The other was made by dehydrating a similar brew to which dextrose or a nonsweetening sugar had been added. The additions gave the powder sufficient volume for accurate, machine packaging, greatly reduced hygroscopicity, and prevented caking on exposure to humid atmospheres. The latter powder is called "soluble coffee product," and is the type employed for this study, since it is used exclusively in operational rations and would be the coffee recommended for mobile kitchens.

Ample Production

A survey of the production capacities of factories making soluble coffee product shows that all wartime manufacturers are still in business and that several others have more recently entered the field. There is no question about the capability of industry to supply the soluble coffee requirements of the Armed Forces.

Bulk vs. Cost

Data in the accompanying table answer the questions relative to comparisons of costs, weight saving and space saving. Costs were calculated on basis of present-day average market prices for ground roasted coffee and soluble coffee product. The difference of 18.34 percent in favor of ground roasted coffee is in contrast to the 56.7 percent difference in weight and 71.5 percent difference in space requirements in favor of the soluble coffee product. The advantages in weight and space requirements of the soluble coffee product apply not only to the mobile kitchen storage but also to packaging and packing expense and to warehousing and transportation requirements. These advantages may easily offset the higher material cost of the soluble coffee product.

The utility aspects of using soluble coffee product are so obvious that no study was made of the time required to add hot water to powder in a cup as against the time consumed in brewing ground coffee.

GI's Wanted More

Acceptance of soluble coffee by combat troops is indicated by the quantities used during World War II in the areas where freshly brewed ground coffee was not to be had. The demand by the soldiers was always for more of it, even though it is not equal to freshly brewed coffee in all respects, particularly where the important factor of aroma was concerned.

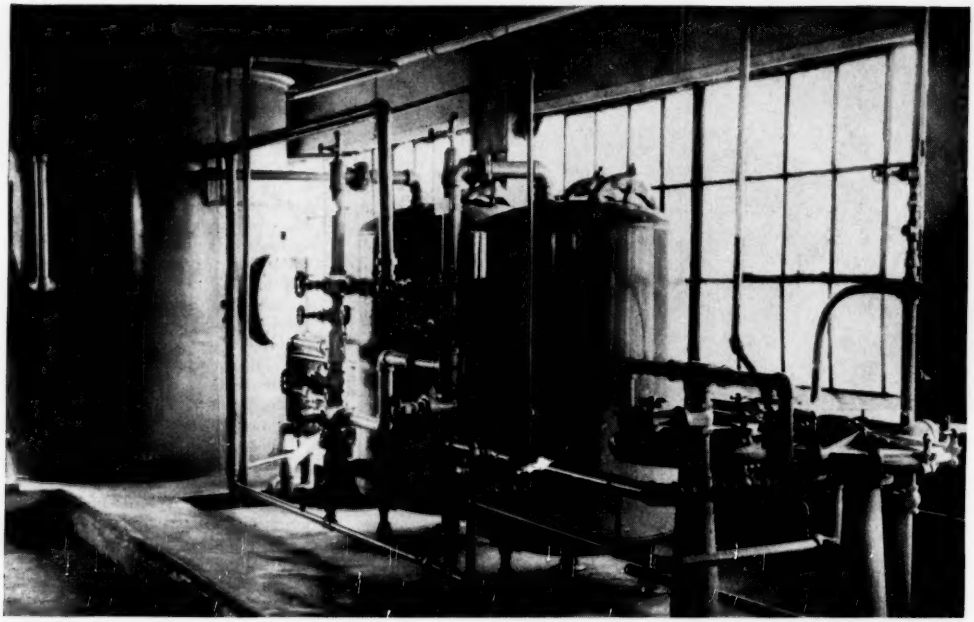
The advantages of the soluble coffee product for use in the mobile kitchens are stimulating active research by both the Quartermaster Food and Container Institute and industrial laboratories to determine how the aroma may be retained during the making of the soluble coffee powder. Some promising progress is being made, especially with infrared radiation in the drying of coffee extract.

COMPARATIVE RELATIONSHIPS Between Ground Roasted Coffee and Soluble Coffee Products

Factors	Ground Coffee	Soluble Coffee Product
Market price per pound	$0.375	$1.04
Amount of brew per serving by volume	8.0 oz.	8.0 oz.
Weight of coffee per serving	11.5 gm.	5.0 gm.
Weight of coffee per 1,000 servings	25.4 lb.	11.0 lb.
Difference in weight per 1,000 servings	.....	14.4 lb. = 56.7%
Number of servings of brew per lb	40.0	90.0
Cost per 1,000 servings of brew	$9.35	$11.45
Difference per 1,000 servings	$2.10 = 18.34%	
Approximate density of powder	24.9 lb./cu. ft.	37.3 lb./cu. ft.
Space per 1,000 servings	1.02 cu. ft.	0.29 cu. ft.
Difference in space per 1,000 servings	.....	0.73 cu. ft. = 71.5%

* This paper reports research undertaken by Quartermaster Food & Container Institute for the Armed Forces, and has been assigned number 240 in series of papers approved for publication. Views or conclusions contained in this report are those of authors. They are not to be construed as necessarily reflecting the views or indorsement of the Department of the Army.

MODERN TREATING SYSTEM: How it looks . . .



THESE efficient units deliver "super"-safe water for use in soft drinks. Free from troublesome organic matter and microorganisms, the water is also odorless, tasteless, colorless and low in alkalinity. (Photos courtesy Infilco)

Water Treatment *Spells* Better Beverages

—because it provides soft, bacteria-free crystal-clear water. And that's "more than half the battle" in getting uniform, top quality soft drinks

B. C. COLE
Technical Director, The Seven-Up Co., St. Louis

"Get the right water" has always been a maxim of soft-drink makers—but a change has come about in what they mean by "right water."

When the early day beverage man sought water, the health aspect was, necessarily his No. 1 consideration. "It has to be safe," summed up his criterion. And rightly so, because yesterday's means and methods of water treatment didn't compare with today's very efficient procedures.

Now, however, this safety consideration has, as far as he is concerned, almost ceased to exist. The water which enters his modern beverage plant has already been tested and approved by the city as safe and healthful. And actually it is.

But that does not mean it is a satisfactory water for making carbonated beverages. In fact, most of the time it is not.

Drinking water may contain a few hundred parts per million alkali, expressed as $CaCO_3$, and be accepted by the water consumer as good. From the standpoint of water for drinking purposes, most people might even prefer this water to pure, completely tasteless distilled water.

In carbonated beverages, however, the citric, tartaric or phosphoric acid, often used to produce the tart taste, reacts with the alkali in the water to produce neutral salts. The acid disappears in proportion to the alkalinity, and the beverage taste changes accordingly.

Hardness A Common Problem

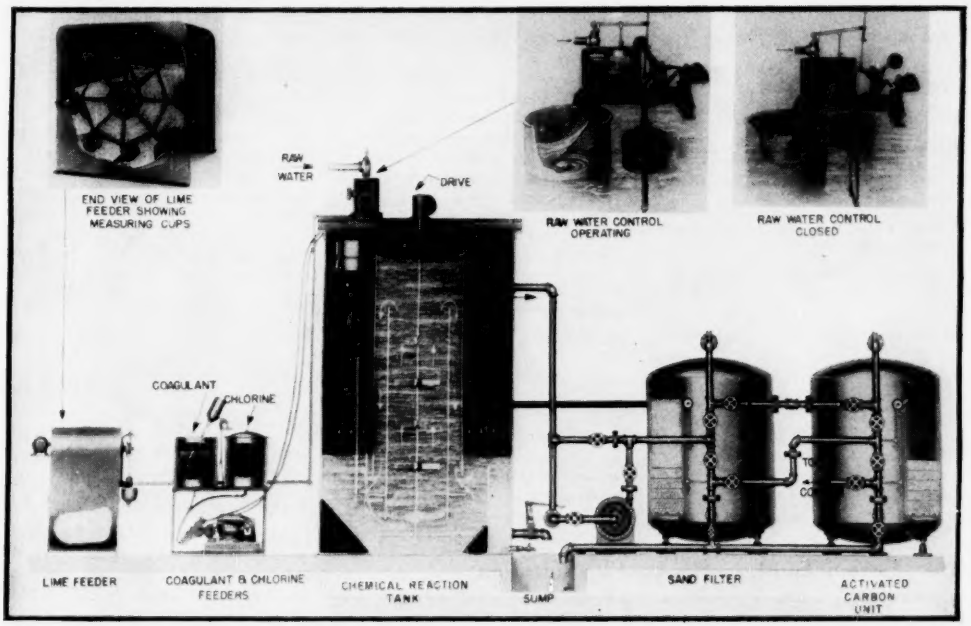
Water with an alkalinity of approximately 200 ppm. is common, yet this amount will completely neutralize, or destroy, one-fifth or more of the acid present in many carbonated beverages. Water with alkali content of less than 100 ppm. is, therefore, recommended for practically all beverages, and some companies recommend the lower maximum of 50 ppm.

It has long been recognized that most waters have a definite taste, and that there are decided differences from one locality to another. These taste variations make the production of a uniform beverage over a wide area very difficult. The obvious solution to the problem is treatment designed to make water supplies uniform.

Water tastes may result from the presence of many substances. Some of the most common offenders are: (1) Total dissolved solids; (2) special minerals, such as iron or sulphur; (3) by-products of the growth of water plants; (4) dead organic matter; and (5) added chlorine.

If the total dissolved solids content of a given water supply is very high, a decided taste will be imparted, varying according to the types and concentrations of the solids. One town in North Dakota, for example, uses water which at times contains over 4,000

. . . and how it works



RAW WATER enters large reaction tank (center) and is mixed with chemicals. Thus, organic matter is removed, alkalinity reduced, chlorine increased. Sand filter (right) takes out suspended matter. Carbon unit adsorbs chlorine.

ppm. total solids. This water can never be used if good beverages are sought. In fact, it can't even be good drinking water until the total solids content has been greatly reduced.

The exact total solids content which can be tolerated varies with the individual beverage and the nature of the dissolved substances. If the final taste is impaired, or if a precipitate forms, the water quite obviously, is unsatisfactory.

In some cases it is not the large amount of dissolved substances present that causes the trouble, but rather the nature of even small quantities of certain minerals. Iron or sulphur, for instance, create a problem even in low concentrations. And any chemical wastes or traces of oil are, of course, serious.

Plant Life and Organic Matter

City water engineers have long been familiar with some of the tastes and odors caused by plant life—certain of the algae, for example. These off-flavors vary from "pig-pen" and "fishy" to tastes barely detectable. All, naturally, are undesirable. They are objectionable in water itself, but the sale of water is usually a non-competitive enterprise, and a slight deviation from standard is not a business hazard.

In the beverage industry, the reverse is true. Continuous taste and flavor appeal are all-important.

At times, the objectionable foreign ingredients may be the aforesaid organic matter made up of tiny fragments of dead plants and animals. This is especially likely during spring and fall, when lake or reservoir waters literally "turn over," due to changes in temperature. Organic matter is brought up from the bottom of the lake and causes serious difficulty.

Actual beverage problems created by the presence of organic matter are:

1. Foaming, that makes satisfactory bottle filling and uniform carbonation difficult.
2. Flaky, stringy, or ring-in-bottle-neck sediment.
3. Musty, stale or woody taste, especially after aging a few days.
4. Formation of deposits which will support the growth of microorganisms.

These are serious enough to constitute a real threat to the sale of any beverage, and they make water control a definite requirement.

Residual Chemicals and Organisms

The chemicals used for treating water at the city plant may make it completely unsuitable for use in beverages. This is particularly true in the case of chlorine, which is added for a very good and compelling reason. But its presence may completely wreck a beverage flavor. A characteristic medicinal taste is often developed, sometimes described as resembling iodine. If chlorine is present in sufficiently large amounts, it is also conceivable that some bleaching action might take place in colored beverages.

It is almost unnecessary to say that beverage water must always be clear and colorless. Any suspended matter provides a surface which will cause loss of carbon dioxide from the carbonated product, even if it has no other undesirable effect. Likewise, any substance which would impart color to water would adversely influence the color of the final beverage.

Microorganisms are another source of beverage spoilage. Yeasts—by far the most common offenders—can usually be traced to unsanitary practices within the plant rather than to the water supply.

Molds sometimes cause spoilage, and may be present in water. Municipal filtration and chemical treatment cannot be depended upon to kill all mold spores. In fairness, it should also be said here that mold spoilage usually can be traced to lack of proper sanitary procedure within the plant.

Some water-borne bacteria can cause spoilage in carbonated beverages. A few organisms may enter with the

For Top Quality Soft Drinks Your Water Must Be—

- **Able to meet all public requirements for potability.**
- **Low in alkalinity.**
- **Crystal clear, odorless, and tasteless.**
- **Free of organic matter, both living and non-living.**
- **Free of taste caused by chemicals such as chlorine.**
- **And free of organisms which, by their growth, could cause beverage spoilage.**

water, contaminate plant equipment, and prove to be a considerable problem.

This all leads to the prime question: "What makes a satisfactory water for carbonated beverages?" And herewith these important characteristics are summarized (see accompanying box).

Since the maintenance of high quality water is of such great importance to the manufacturer of carbonated beverages, and since there are thousands of beverage plants in the U. S. alone, it is not surprising that the water problem has been attacked from many angles, and that numerous methods of treatment have been developed.

It is not the purpose of this discussion to explain the many methods of water control now in use. In fact, changes are taking place regularly, and the most popular and generally accepted systems now in use may be obsolete in ten years.

How Water Treatment Does the Job

At any rate, a practical water control program for the average plant must solve the problem of providing water with the essential characteristics. One popular type of water treatment is as follows:

1. Incoming water enters a large chemical reaction tank somewhat similar in design to that used in many municipal plants. As the water enters this tank, chemicals are added and mixed with it. These chemicals usually include lime, chlorine and a coagulant such as alum or ferrous sulphate. Other chemicals may also be added, depending on the composition of the water.

Calcium chloride, for instance, is used to aid in the removal of sodium alkalinity. The chlorine is fed in a rather heavy dosage. The term "super-chlorination and coagulation" is being used more and more. Purpose of the chlorine is not merely to make the water safe, but literally to burn out traces of organic matter.

The bottler is usually not familiar with such terms as "free chlorine", "combined chlorine", "residual chlorine", "breakpoint process," and "chlorine-ammonia process". Nevertheless, he does know that if his orthotolidine test shows from 6 to 8 ppm. chlorine after the water has passed through the sand filter, he will not experience trouble from organic matter.

Foreign Matter Settles Out

In the large reaction tank, alkalinity, organic matter, and some tastes and odors can be controlled. Colloidal suspended matter is made to settle out by flocculation, and a clear water is produced. This water, however, is not ready for use.

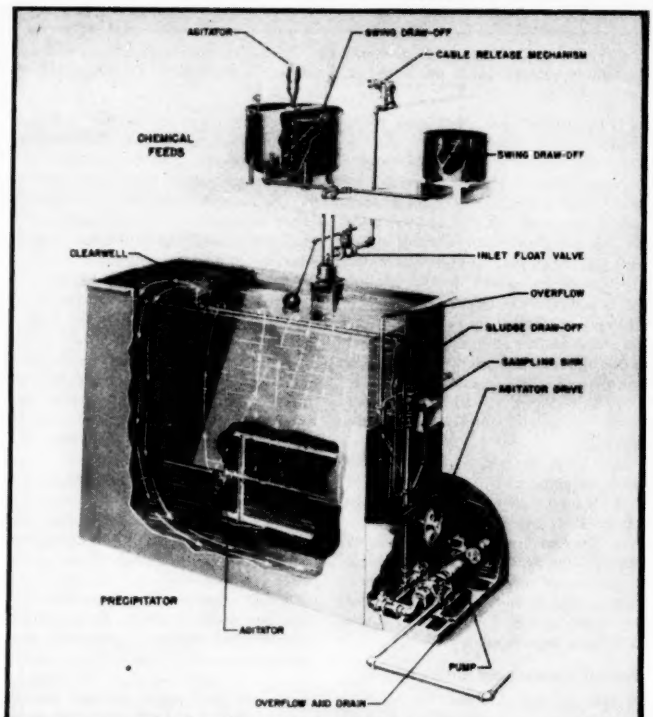
2. The second piece of equipment is a pressure type sand filter. Its purpose is to remove any suspended matter which might find its way over from the chemical reaction tank. It is backwashed daily with super-chlorinated water and thus never becomes contaminated.

3. The third unit—a tank similar to the one containing the sand filter—contains activated carbon or some other material which has a great chlorine adsorption capacity. It may also remove other tastes and odors, but its chief purpose is to remove chlorine, thus providing a taste-free final effluent. This unit, too, is backwashed daily with super-chlorinated water, thus preventing its contamination.

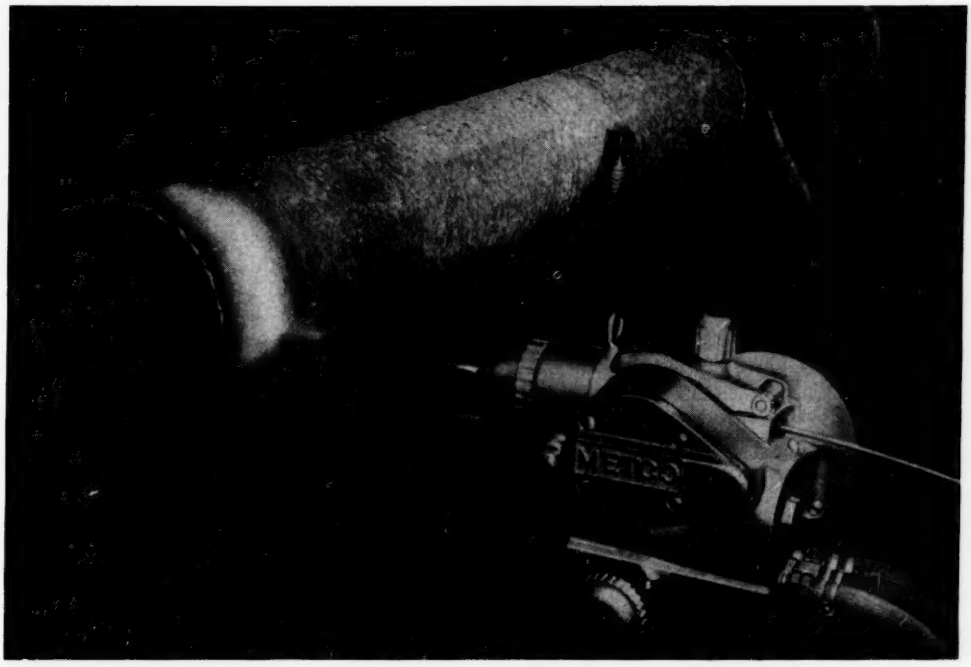
4. As a final step, and as a means of being absolutely sure that no suspended matter of any type is carried over, the water is passed through a fine filter to insure the highest polish.

The completely treated water is super-safe, clear, colorless, odorless, tasteless, low in alkalinity, free of troublesome organic matter, including organisms which might cause spoilage, and has all of the chlorine removed. It is ready to be cooled over shining stainless steel, then carbonated in a clean, sterile carbonator, next mixed with a flavoring syrup, which was also made with completely treated water, and finally sealed in a clean, sterile bottle.

This System Employs Horizontal Agitation



THREE-STAGE PRECIPITATION is used in another procedure. Continuously, it sterilizes water, removes organic matter, and lowers alkalinity. Fine particles are then filtered out in a Neutralite unit, and taste and odor are removed in an activated carbon purifier. (Photo courtesy The Permutit Co.)



1 **ACTION SHOT** shows minute globules of metal being driven onto worn part—to give new, long-lasting wearing surface. Fast process rapidly returns part to service, and food processor saves money.

Metallizing Extends Life of Food-Processing Equipment

Coatings go on quickly—will repair all kinds of working units that are subject to wear. And corrosion resistance is aid in sanitation

JOHN WAKEFIELD
Flushing, N. Y.

There is fast growing use today of metallizing in food plants. For this coating process has really proved itself in the rebuilding of worn bottling and canning machine parts, pump packing sections, and refrigerating-compressor components—just to name a very few—and also in the repair and maintenance of many other units. Moreover, metallizing appears to have possibilities far beyond its present use.

Improvements in the guns and accessory controls have increased the speed of spraying metals. New methods and materials have improved the coatings. Recent intensive research on sprayed metals themselves has added greatly to a clearer understanding of their structure and physical properties.

True, in the early days of metallizing, a number of failures occurred, particularly in the field of corrosion protection. Coatings applied to cooking equipment, tanks, and other food processing equipment, did not stand up as expected. But today, notable advances have been made. And as will be brought out, none of the old failures need be repeated.

Let us review the subject in the light of modern knowledge.

How Coatings Are Formed

Modern metallizing is almost all done with wire-type guns similar to the one shown in Fig. 1. A compressed air activated turbine operates two wire rolls that feed the metal continuously into the center of an oxy-gas flame. This melts the metal, and then it is broken up into tiny molten globules and driven against the work.

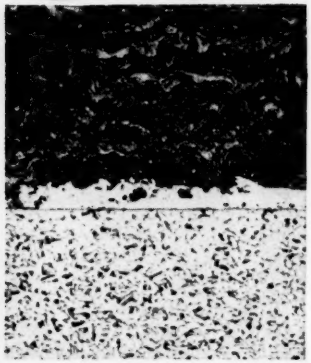
When a molten particle leaves the gun, a very thin film of oxide forms around it. The molten particles strike the work with great force and flatten out. The surface area is greatly expanded and the oxide film is broken, exposing pure molten metal again. This bonds to the oxide re-formed on the particles which have landed previously, and the process is called oxide cementation. Particles are held together in the coating by a combination of oxide cementation and physical interlocking.

The structure of sprayed metals, then, consists of flattened particles of pure metal, surrounded by very thin films of oxide. There are also voids where particles have partly bridged over. From this, it is easy to see that sprayed metals are somewhat porous, are inclined to be brittle, and have a relatively low tensile strength. In Fig. 3 is illustrated a greatly enlarged cross section of sprayed low carbon steel (the dark section) on a mild steel base (the light, crystalline section). The white section between the two is a new self-bonding undercoat, which will be discussed presently.

With a "Sptt!", gun gives motor shaft . . .

2 GRAPHIC CLOSEUP of metallizing gun building up ⅝-in. pulley end of the shaft of a fractional-horsepower motor used in a food processing plant. Proof of an excellent job is photomicrograph, revealing . . .

. . . tight bonded buildup



3 . . . SPRAYED low carbon steel (dark) on mild steel (light), with bond layer (white) between the two.

All sprayed metals are porous to some extent. The degree of porosity depends on the type of metal and how finely it is atomized when sprayed. Some idea of the relative porosity can be gained from figures on the specific gravity of the same metals before and after spraying. The sp. gr. of aluminum for example, is 94.1 percent of that of the wire before spraying. Stainless steel 18-8 type is 88.9 percent after spraying, and tin 88.1 percent. In all cases, the specific gravities of the sprayed metal are given as percentages of the sp. gr. of the same metal in wire form before spraying.

For mechanical applications, porosity is usually a distinct advantage. The pores absorb and hold oil. They permit sprayed metals to run with much less friction than ordinary metals. In service, for example, a spindle sprayed with .10 carbon steel, will invariably outwear a solid spindle of equal carbon content. Reason is the reduced friction and slightly greater particle hardness of the sprayed materials.

There is quite a chilling action in spraying metal, and this makes particles quite a good deal harder. In addition, the carbon steels particularly tend to pick up a little more carbon from being sprayed. Most sprayed metals, then, and particularly the steels and stainless steels, have much greater resistance to wear than ordinary metals do.

When it comes to coatings applied to protect equipment against corrosion, porosity is a disadvantage. Fortunately, however, it is by no means an insurmountable problem. Metals like zinc and aluminum, which are anodic to iron and steel electrochemically, will guard the surfaces in spite of porosity, since they protect largely by sacrificial means.

Coatings like tin, stainless steel, Monel and nickel, which are cathodic to iron and steel, can often be effectively sealed, so that liquids cannot penetrate to the base. With tin coatings, this can be done by lightly blasting the coating with round steel shot. The harder metals listed are sometimes sealed by treating them with raw tung oil, or raw or boiled linseed oil, mixed with 5 percent by volume of cobalt liquid dryer. They can also be sealed by thoroughly saturating with molten Acrowax C.

With an understanding of these matters, it becomes obvious that metallizing can be used for the corrosion protection of many kinds of food processing equipment—such as fish cutters, conveyor equipment, tanks, cookers, agitators, and many other units.

However, the important thing is the selection of the right sprayed metal for the particular conditions.

Correct Preparation Is Essential

Research on metallizing has shown, more clearly than ever before, how important good preparation is to the success of the work. Today, there are ten or a dozen different ways of preparing parts. All are useful for various types of work. Most significant is the fact that they all do two things: Clean the base thoroughly, and roughen it to provide hooks and craters as keys for the sprayed metal particles.

As far as cleaning is concerned, metallizing is no different from other methods of adding or joining metals. In soldering, welding, brazing, and plating best results are obtained when the base metal is absolutely clean. The same is true in metallizing.

Anti-corrosive metallized coatings are usually applied to tanks, kettles, structural and irregular shapes. Best preparation is to use a pressure blast machine and G-16 or G-18 angular steel grit. Where the abrasive cannot be recovered and used again, a good grade of hard, angular, washed sand, from 16 to 20 mesh, can be used instead of steel grit. Silica or flint is preferred. Where blasting is done with sand, it is advisable to apply about .0015 in. of .10 carbon steel before spraying the coating of protective metal. This increases the bond strength very greatly and also prevents blistering in case the final coating is entirely immersed in liquid.

There are several ways of preparing mechanical parts for metallizing. The method which produces the strongest bond is to take a light cut over the surface which is worn, clean it up, and true it. Next, a 24 to 30 pitch thread is cut. This is followed by application of a rotary shaft preparing tool made up of five circular saw-like blades assembled with teeth staggered. Several light passes are made over the threads with this tool to roughen them further.

Self-Bonding Undercoat

The newest method of preparing shafts and bearing surfaces does an excellent job and saves considerable time and money. Some months ago, it was found that an alloy high in molybdenum can be sprayed with an ordinary metallizing gun, and will bond itself firmly to most metal bases. For some reason, as yet unexplained, it does not bond to copper, brass or bronze. However, it does bond strongly to steels, stainless steels, Monel, nickel, magnesium, and most aluminum alloys.

In this method, the threading and special knurling operations are eliminated altogether. All that is necessary is the light, fast, roughing cut to clean the surface. Then, about

.0015 in. to .002 in. of the self-bonding alloy is sprayed on, and the surface is ready for the final build-up. Any kind of sprayed metal, including copper, brass and bronze, can be applied over the undercoat and will bond very strongly to it.

So much for methods of preparation, except to say that 95 percent of the early failures of metallizing on mechanical parts go back to careless or otherwise improper preparation.

Non-Porous Coatings Made

A new method which produces entirely non-porous coatings has been introduced recently. Actually, it is a combination of metallizing and welding, since the coating is fused after spraying. It was originated to achieve a hard facing, but has since been found to provide a coating highly resistant to corrosion as well as hard knocks. It has stood up excellently in very strong acids.

One processing plant, by way of example, tried out the process on pump rods. The acid condition encountered had necessitated the use of Monel rods, but abrasion was so severe that the rods wore out in less than 30 hr. Packing had to be replaced every 8 hr. After the new material was applied and fused, rods ran over 680 hr. and packing lasted more than 60 hr.! And no appreciable effect was noticed from acid action.

The new material is a powdered nickel, chromium, boron alloy made into wire by the use of a plastic binder. When sprayed, the metal particles are deposited on the work, while the plastic is completely volatilized. Preparation consists of light blasting to clean and slightly roughen the surface. Then the alloy is sprayed on. It can be applied to any thickness up to about .050 in. In spraying, an allowance must be made for about 20 percent shrink that takes place after the coating is fused and cooled.

Once deposited, the coating is heated to about 1,900 deg. F. The material has a fairly wide plastic range so that it does not run immediately it reaches the proper heat. In torch finishing or fusing, the coating should be brought up to 600 to 1,000 deg. F. by passing the torch back and forth over the entire surface. Then, the torch is moved in to about ½ in. from the coating. It is held at the starting point until the metal takes on a shine. As soon as this happens, the torch is moved slowly along the piece, moving only as fast as the coating becomes fused. The fusing is determined by the shiny appearance of the surface.

Greatest limitation of the method, of course, is the difficulty of heating some kinds of parts to the proper temperature without distorting them—particularly with large, heavy parts. Small ones are much easier to do. Great care should be taken not to cool fused coatings too rapidly. There is danger of cracking, if cooling proceeds too fast.

Furnace fusing is feasible, but it should be done in a controlled atmosphere furnace. The temperature required varies from 1,880 deg. F. (for atmospheres high in hydrogen or carbon monoxide) to 1,980 deg. F. (for a partly combusted atmosphere).

Beauty of the process, where it can be used successfully, is that the coatings are extremely hard and resistant to almost any corrosive condition. It is also promising for the future, since the new method may open up the possibility of other non-porous coatings.

How Machine Parts Are Repaired

Among the applications where metallizing is used to rebuild worn mechanical parts, there are many which are common to almost all branches of the food processing industries. Canneries, meat packing plants, distilleries, and others, occasionally run into worn armature shafts. A good example is shown in Fig. 2. Here, the metallizing gun is building up the ⅞ in. pulley end of a fractional horsepower motor shaft with .10 carbon steel. This is an instance where the new self-bonding undercoat does a fine job.

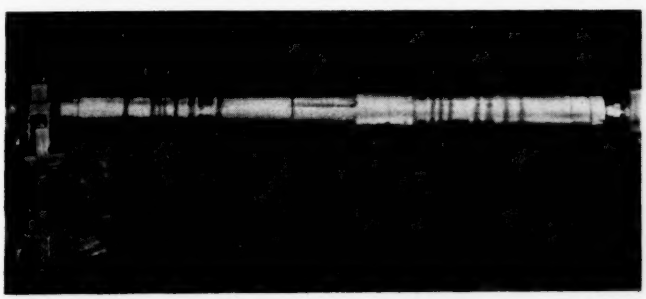
The shaft is set in the lathe, winding and all, and a light cut is taken over the surface. Next, .0015 in. of the molybdenum alloy is sprayed on. Final build-up is completed by spraying on .10 carbon steel. It has to be built up only .030 in. oversize, since coatings are much smoother over the undercoat than over threads. Once sprayed, the coating can be machined to standard with ordinary tools. There is no danger of distorting the shaft or damaging the winding. Thus, a great deal of time and labor is saved through the use of metallizing.

Another common food plant application is illustrated by the brewery pump shaft in Fig. 4. Made of stainless steel, this shaft was badly worn in two packing sections, as shown. The surfaces were cut down .010 in. below the point of deepest wear. A V-thread, 24 pitch, was cut in the undersize section, followed by several light passes of the rotary shaft preparing tool. Spraying was done with 18-8 type stainless steel, and the surface was built up to .050 in. oversize.

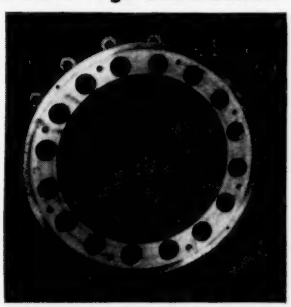
In this case, the coating was roughed down with a Carboloy tool to about .005 in. oversize. Final finish was given with a tool post grinder, using a Norton grinding wheel similar to type 37C46-15V. A very light infeed was used for each pass, with the wheel revolving at 6,000 surface fpm. and the shaft at 43 surface fpm.

Metallizing is at its best on pump parts. Packing areas (like those shown), packing sleeves, plungers, and rods are all good applications. The versatility of metallizing is clearly demonstrated. Stainless steel can be sprayed over worn stainless, over bronze, steel, Monel, or other base

To a Brewer and a Soup Canner These Neat Metallizing Jobs Gave High Satisfaction



4 **REPAIRS** on brewery pump shaft. The part was badly deteriorated in two packing sections. But metallizing soon had it back to work.



5 **HOW** surfacing fixed a piston filler tank worn down in soup line.

metal. Usually, the result is greater service life after spraying than before.

Some of the applications in the food industry are not so general. Mixing paddles and agitators often wear. With the new self-bonding undercoat, it is now quite practical to spray metal back on the worn blades.

First, the surfaces should be thoroughly cleaned. Where the shapes are quite irregular, the best way to do this is by blasting. It can be done lightly, with some ordinary abrasive, since the purpose here is cleaning rather than roughening. Then, the self-bonding alloy is deposited, and the final coating sprayed on the desired areas.

Another interesting application is the repair of the aluminum 16-valve plunger filler tank (Fig. 5). The face had been worn down by the circular motion of the plate that cuts off the flow of soup. Placed in the lathe, a cut was taken, to a depth of 5/32 in., to even up the surface. Next, a thread cut was taken, and the surface was further prepared by an electric method.

Use Nickel-Type Electrode

In this method, a special welding generator is used. A particular nickel type electrode is lightly brushed over the surface of the work. This deposits a series of ragged, crater-like metal particles, which provide an excellent bond for the sprayed metal. Care should be used to see that the electrode material is applied over the entire surface, at least 95 percent. It would be quite practical to use the self-bonding undercoat instead of the electrical method. However, due to the thickness required, the surface should be threaded beforehand. This greatly increases the bonding area.

The surface, in this case, was rebuilt with 18-8 type stainless steel and machined back to standard size. Holes for the pistons were squared up with a small hand grinder.

It may be noted that the metallized surface has already outlasted the original due to the additional hardness of the stainless steel.

There are numerous other mechanical applications—of all sorts—for metallizing in the food industries. Bottling plants have reported excellent results in rebuilding spider shafts, crowner shafts, and crowner heads for filling and capping machines. Distilleries are doing pump shafts, plug cocks, and similar parts. Breweries have metallized many yeast rolls, glue rolls, and compressor parts. Grain mills report work on agitator shafts, paddle blades, screw conveyor shafts, and mill roll journals.

Most of the machine element applications are similar in nature, although the parts vary in size and use. Those covered should suggest many others in various kinds of plants.

The applications of metallizing for corrosion protection may be fewer in number at present, but the possibilities are far greater than even the mechanical type. With modern emphasis on sanitation, there are many places, on all sorts of conveyor equipment, tanks, and housings, where metallized coatings can be extremely helpful. These places can be effectively protected with metallizing at a lower cost —by building with steel rather than building with entirely non-corrosive metals.

Take a fish cutting machine, for example. The author was shown one on the West Coast recently, and he noted that some of the mechanism at the cutting end was made of bronze, some of stainless steel, and the balance of angle iron. Subjected to salt water and acids from the fish, the steel parts were eating away quite rapidly. Nor did constant cleaning and painting prevent it.

But after being blasted and metallized with .015 in. of aluminum, the frames stood up without corrosion for a very long time.

Had the cutter been originally designed with critical parts of stainless steel, and the balance of the framework then sprayed with aluminum, the service life would have been many times what it was in this case.

A number of meat packing plants have reported the successful use of sprayed zinc on both meat hooks and meat trucks. Galvanizing did not stand up very long, due to the thin coating. In metallizing, .010 to .015 in. of zinc was applied. Cost was higher, but insignificantly in light of the protection given.

Protection is in direct proportion to the thickness of the coating. However, the cost is not in proportion. Thus, while .010 in. of sprayed zinc costs about twice as much as galvanizing, it gives about 20 times the protection afforded by .0005 in. of galvanized zinc.

When it comes to larger parts—tanks and similar equipment—the metallized zinc is often less expensive initially as well as giving better and longer protection. Excellent results were obtained with sprayed zinc coatings on the inside of steam chests in a Western fruit and vegetable cannery. Made of sheet steel, the surfaces were subjected to steam and considerable moisture. A layer of .010 in. of sprayed zinc protected the steel sections very successfully. In one case, the metallizing was done at the equipment manufacturing plant, with the joints and welds touched up after installation.

Zinc and aluminum offer many possibilities in this type of work, hence they should not be overlooked. In many cases, they are less expensive than stainless or Monel sheet and structural sections. At the same time, they will prevent corrosion of the iron and steel under them for very long periods. Water tanks, troughs, and other such equipment, can be similarly guarded. Zinc is excellent in water under 100 deg. F., and aluminum works equally well over 100 F.

Need Steel Flash Undercoat

One point which should be stressed: Whenever coatings are immersed entirely in liquid, or fresh or salt water, a steel flash undercoat should be used over the blasted surface. Coatings tend to blister after a time, and the steel undercoat, .0015 to .002 in. thick, prevents this.

Some very tempting applications for metallizing are not good ones. For instance, many food plants would like to spray stainless steel or Monel on tanks, tables, and other processing equipment. But this is generally quite impractical for two reasons: First, sprayed stainless steel and Monel, nickel, and the bronzes, are quite porous. Hence, they must be applied in very heavy coatings—.025 to .040 in.—to prevent penetration of liquids to the base steel. Second, they should also be polished, which is difficult and expensive. These two factors usually make the cost prohibitive and the protection doubtful. In many cases, however, zinc or aluminum could be used here very economically and effectively.

One other thing to be careful about with metallizing—and other methods, too, for that matter—is the use of very dissimilar metals close to each other. It's quite all right to spray stainless steel over bronze on a pump sleeve or roll surface. Any electrolytic action here tends to hold the two together even more strongly. However, it is not a good idea to spray zinc inside a tank containing copper coils, or brass or bronze fittings. This is because electro-chemical action will tend to destroy the zinc even more rapidly than under more normal conditions.

With a little study of metallizing and the particular problems in his plant, the food engineer or master mechanic can make real use of the money saving possibilities. Designers and builders of food processing equipment will do well to investigate the wear- and the corrosion-resistance of sprayed metals even more carefully. Both in salvage of used equipment, and also in the protection of new equipment against wear, abrasion, corrosion, or all three together, metallizing has a good deal to offer.

STRESS is on functional modern architecture in extensive new Lehigh Valley Dairy. Highly groomed and landscaped, it resembles attractive civic center rather than conventional processing plant.

DAIRY PROGRESS TODAY

Aim of 1949's industry is to render complete service, profitably, through a well-balanced program: Advanced engineering skilfully paced by public goodwill and wise labor relations—exemplified by Lehigh Valley Dairy's striking success

IVAN C. MILLER
Editorial Consultant, "Food Industries"

From scratch to a $3,000,000 plant and a $6,000,000 sales volume in 15 years: That is the outstanding record of the Lehigh Valley Dairy in Allentown, Pa.

Granted, it was not an easy goal. It had to be worked for.

The organization was formed in the depression years as a marketing co-op of dairy farmers. Its members hoped to sell their milk to local dairies for a better price than they could demand as individual farmers. But this initial plan didn't pay out. Their position was not improved, because milk was plentiful and markets limited. Something else had to be done.

The answer was—enterprise. In 1934 the cooperative started its own processing and marketing of fluid milk. And that was the impetus needed. Since then, growth has been continuous, profits good. New products have been added to balance production seasonally. And finally a new $3,000,000 plant has been built.

To clinch it, capacity has been given pointed attention. If milk demand doubles, this roomy structure "can take it." What's more, the byproducts accommodations are likewise ample. There is no bottleneck bogey here.

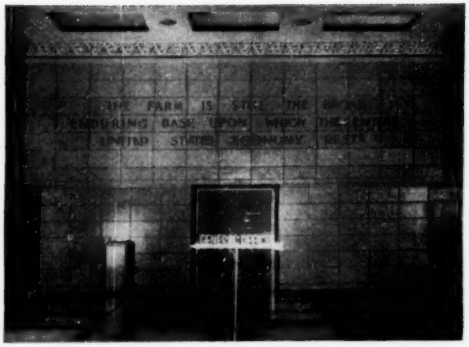
Salient point in the phenomenal growth of the dairy has been its sound public relations program, built to gain confidence and goodwill—confidence in the quality and worth of the product; goodwill through fair pricing and fair dealing.

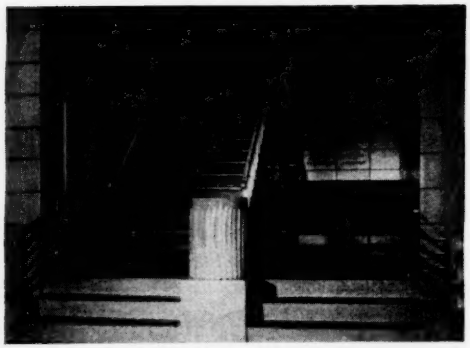
Other contributing factors—equally important—have been the dairy's progressive labor relations policies, the

Big Picture Flow-Sheet Rounds Out the Story

The *quality dairy service*, cogently detailed here, finds its fundamentals in the *quality dairy products*, whose processing is graphically portrayed in the fold-out photo-and-diagram flowsheet on pages 92-95.

There Are Modern Appointments

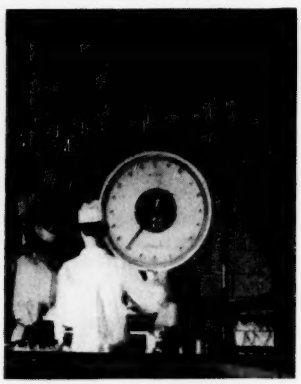




STRUCTURE is just as attractive inside as out. On entering, visitors are first apprised (above left) of farm's vital role.

And in the Plant Proper, Public Views

THESE ROTARIANS and their wives, from Nazareth, Pa., give rapt attention as they observe the various plant operations through plate-glass panels.



THEY see the milk dumped from 10 gal. cans, weighed, and sampled.

advanced engineering it has employed, the notable methods of quality control and of sanitation, and the meaningful attention to efficiency and economy.

We will relate the role each of these factors has played—

Enlightened Public Relations Gains Community Support

From the start, the public relations program was plain and simple. The formula is old and basic—the keystone for all good public relations. The program is noteworthy because of the extent to which the basic formula has been applied, because of the monetary investment, and because of the relentless drive of management to perfect the plan and meet its demands.

This is the formula: *Let the whole public see in detail how your product is made, let the people witness the care used to safeguard quality, the cleanliness of the plant, the sanitary precautions to preserve purity, the investment in equipment and the pride of employees in standards maintained.*

This formula, which is especially applicable to food plants, is plain and simple. Applying it, however, requires planning, dexterity and vigilance. The public relations program at the dairy not only dictates daily procedure, but enters dominantly into all long range planning, even to the design and structure of plant and buildings.

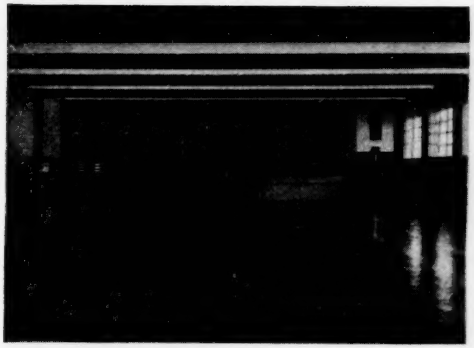
Big Value From Visits

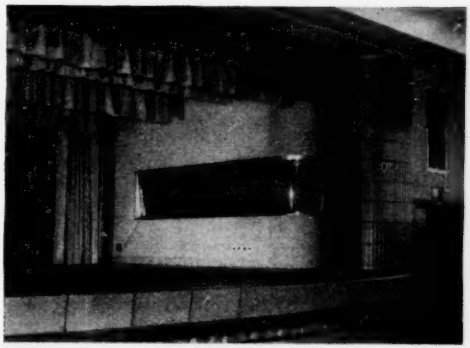
First processing operations started in the depression year 1934, with an extended open-house to which the public was invited. Plant visits were encouraged throughout the following year. Influence of these visits on sales volume was demonstrated in 1936, when the attendance of a definite and influential group was planned, a program prepared, an inducement offered. The invitation was specific, the attendance beyond optimistic hopes.

Equipment for irradiating and homogenizing pasteurized milk had just been installed. The irradiating process had been developed by the Wisconsin Alumni Research Foundation and was licensed for building vitamin D in milk. And the dairy was one of the first plants in the East to install this type equipment in a milk pasteurizing line.

Dr. C. P. Segard, an authority on nutrition and malnutrition, and a member of the Foundation, was asked to come to the dairy and address an audience of medical men, to explain the need for incorporating vitamin D in

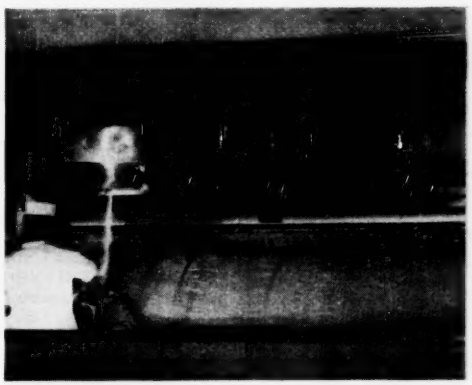
And Also Community Facilities



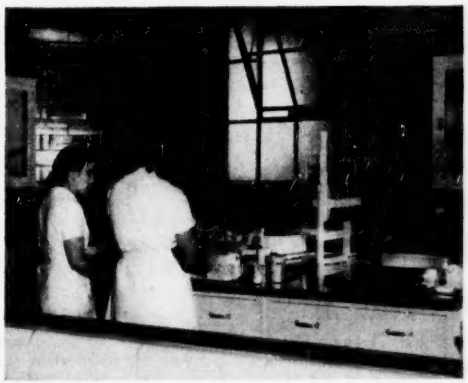


AUDITORIUM seats 1,000, has modern stage and television installation. Catering facilities are located behind stage.

Processes Along Show-Case Corridors



ALSO skim milk, resulting from the separation of cream, dried on steam-heated rolls for use in ice cream.



AND at laboratory, they watch technicians prepare samples of cream to be tested. Tours cover all processes.

milk and the penalties to the children in communities with a vitamin D deficient diet.

As a part of the program, medical associations of the two counties in which the dairy's distribution is concentrated visited the plant to inspect the irradiating equipment and observe the process in operation. The upswing in sales volume that followed the meeting formulated long range plans. It concentrated management's efforts to bring groups with common interests to visit the plant.

Plant Visits Are Encouraged

These immediate efforts brought many professional and civic groups to the plant. Then the youngsters, from the lowest grades up, were invited, through their teachers and group leaders. Among professional groups visiting the plant are: Nurses from hospitals in the area; dieticians and nutritionists from the high schools and Cedar Crest college; home economists from Pennsylvania State Extension classes, and bacteriologists from Lehigh and Lafayette Universities. Business clubs—Rotary, Kiwanis, Exchange and Lions—and women's clubs, from the surrounding districts, are among the civic groups that have watched processing of the dairy's products.

City and county groups have visited the plant. As an annual routine, the Safety Patrol of the Allentown Police Department makes a trip. Youth club leaders arrange for visits and accompany 4H clubs, Boy and Girl Scouts. They come as far as 50 miles to visit this plant. School teachers accompany grade and high school pupils. Their interest equals that of the youngsters. The plant visit supplements courses taught and promises animated discussions in future classes.

Although the flow of visitors to the plant today is regular and largely automatic, it was not always so. The volume was stimulated, the traffic created. Promotional effort primed the pump for present visitor volume. In addition to personal invitations extended to groups, billboards flanking the main highways entering Allentown, encourage visits to the dairy.

Newspaper advertising sells plant visits as strongly as it boosts quality of products. So do radio broadcasts, carried on four local stations. In recent years the programs report high school and nearby college athletic events. The dairy takes a keen interest in today's youngsters who will be tomorrow's market. That is why so much of the program is now devoted to these youngsters in the area.

The dairy's sales volume in 1948 was 20 times as large as it was during the first year of operations. New products and new processes were added to keep pace with increasing sales. Plant expansion was necessary. The new construc-

tion that this expansion required moved ahead orderly, according to a long range plan engineered to fit the needs of the public relations program.

In the planning, processing departments were laid out so that visitors could be conducted along glass windowed observation corridors to observe every operation and return to the starting point without interfering with production.

Time required for a group to make the trip is a variable, depending on the character of the audience and the interest displayed. Trained to explain the "how's" and "why's", route supervisors conduct most of the individuals and families through the plant, also pilot most of the school children. Professional groups are assigned to technical men. There is no limit to the time and effort given to these groups. The impact is convincing.

Auditorium Added

Building expansion included two non-processing departments that were also engineered to fit the program's needs. These were the auditorium and the dairy bar. The auditorium seats 1,000. Stage and lighting effects are modern. So is the broadcasting control room, which is wired for television and from which symphony and other civic programs originate. Space is provided behind the stage for a cafeteria with accommodations for caterers. There is now greater inducement for professional and civic groups to visit the plant, and luncheons and meetings are held in the auditorium followed by an observation tour of the processing departments.

The auditorium was not erected as a means of producing revenue directly. It is never rented. Groups holding meetings or luncheons in it do so by invitation. When luncheon meetings are held, catering service is at the expense of the group. But indirectly, the auditorium is productive. It is an attraction in itself and it brings more groups to the plant, thus furthering the objective of the public relations program. It also serves as a meeting place for the membership of the cooperative.

Dairy Bar Aids Retail Sales

The dairy bar, which was added as a part of the expansion plan in 1947, provides a much needed place where the 275 employees, and farmer members, can obtain hot meals and lunches. Before the dairy bar was built, local and transient traffic stopped at the plant to make retail purchases of dairy products. These orders were filled from storage rooms, thus interrupting operations. Now, small cash and carry orders are handled by the dairy bar.

The dairy bar was not built as a money maker. It was built as a part of the public relations program. As such it has greater worth than any direct returns it might bring in. The dairy bar is spacious, clean, impressive. Here, local townspeople and passers-by become familiar with the dairy's products, over-the-counter. If customers show interest in the dairy or its products, they are invited to visit the plant. And many do.

First aim of the public relations program is to acquaint the public residing in the plant's distribution area with everything that takes place in processing products in the plant. The program also works outside the plant. Driver-salesmen wear tailored uniforms. Delivery trucks are washed daily, painted frequently. Trucks of the haulers who bring the milk from the farms are all painted alike. They bear the name and emblem of the dairy. Haulers are expected to keep their trucks as clean as the delivery trucks. Washing facilities are provided at the plant without charge.

In 1943, the Dairy Herd Improvement Center was established. Its purpose was to build up the quality of the herds of the cooperative's members who supply milk to the dairy. Breeding is through artificial insemination. Last year, more than 11,000 membership cows were bred. The service of the Center is limited to members of the cooperative. As one result, the membership has increased, building a potentially larger reservoir for the supply of raw milk to the plant.

Less than half of the membership now ships milk to the plant. And shippers are only added as sales volume justifies. Farms of the shipper members are identified by a colorful sign. There are over 600 of these identifying signs scattered over the 30-mi.-radius area.

There are several ways of measuring the success of the public relations program of the dairy. The size of the plant is one, and the volume of sales is another. Growth of membership in the cooperative—both of shipper members and non-shipper members—measures the program's success. Twenty-six of the 34 farms that supplied the first milk to the plant are still shipping. Three of the others are not producing milk.

According to a Pennsylvania State report, there are 92 distributors of dairy products in Area 6, which is made up of the four counties in which the company's distribution is concentrated. The Lehigh Valley Dairy today accounts for 42 percent of the total volume of dairy products distributed in the area.

Sound Employer-Employee Relations Promote Labor Harmony

A high level of labor relations is as necessary to the consummation of a public relations program as impressive buildings and the concerted sales effort of management.

Labor's role in harvesting the fruits of plant visits is in polishing the rough plan of management by evident good housekeeping, and by a convincing demonstration of pride in plant and product. The workers are in the spotlight when visitors are in the plant. Their attitude, while they are on the stage, contributes vitally to the success of the plan. The fact that the public relations plan of the dairy is an outstanding success is proof of good management-labor relations.

Cooperation of labor is no accident. Management compensates. There is evidence that management recognizes employees as teamworkers and also has a sincere interest in the individual worker. The pension plan is an example. Last year, management drew up a proposal for a pension plan and submitted it to the employees through their independent union. The proposal was accepted and is now functioning. The dairy is a processing and marketing outlet for the products of a farmers' cooperative. It was necessary to have the approval of the employees for the pension plan because it, too, is cooperative.

Employee Pension Plan

Each employee pays into the pension plan monthly. It is not like getting something for nothing. The employee pays in advance for security in the less productive years of his old age, but he does not carry the load alone. More than half the burden is the dairy's share in cooperation.

Any pension plan which lightens the load of the last productive years and those that follow—any plan or program which during the most productive years removes the fear of insecurity in the declining years—is a boon to those who labor for wage or salary in the modest income brackets. Adoption of pension plans by industry has contributed measurably to the increased productive effort of labor and has also created a more vital interest in company progress during labor's most productive years. Pension plans are a step ahead for both management and labor.

But, what about the workers whose employment is terminated before retirement, all too often when rehabilitation is outlawed by age? What about those who terminate their own employment for reasons justified or not, who in

MORALE IS ACCENTED: During work . . . **. . . and after**

WORKING CONDITIONS instill employee cooperation.

REST ROOMS are "equal to those in a modern hotel."

so doing, not only lose hope of security in after years but the earnings which were paid into a pension plan?

Pension plans, though they ease the years after retirement for those who remain on the payroll, cannot provide for those who are not with the company when retirement age arrives. Few plans even reimburse departing employees for the amount they have paid toward pensions while working for the company. The Lehigh Valley Dairy plan does. This plan deserves attention because it provides a pattern for a plant of any size, at a minimum cost of administration.

How The Plan Works

The retirement age is 60. Retirement pay is $4 per month for every year the employee has worked for the organization, up to a maximum of $100 per month. An employee at retirement age may elect to stop work, or he may continue at his job, drawing wage or salary and retirement pay as well. Each year he continues to work, he adds to the amount of the retirement pay. When the plan went into effect in January of this year, seven employees automatically went on retirement pay. Yet all of them continue to work and receive both wage and pension.

Each month, the amount due for pension payments plus operating expenses is determined. Employees are assessed an amount to cover the current month's expense, by payroll deduction. Management places in a special fund an amount equal to the total payments of the employees. This continues until the fund reaches $10,000, at which level it is maintained. Thereafter, management's contribution goes to share the actual cost of the plan—meeting labor's assessment on a 50-50 basis.

When an employee's service is terminated, whether by management or by the individual, the worker is reimbursed for the full amount he has been assessed to support the pension plan. Should he die after he is 60 years of age, and before the amount paid him in pensions equals the total of his past assessments, the difference is paid to his heirs. All such payments are met by drawing on the special fund. Funds for operation of the pension plan are administered cooperatively by a board of six members, three elected annually by the employees' union, three appointed by management.

The plant-visit plan was designed by management as a means of increasing sales volume, not to improve labor relations. But most workers seem to relish the moments in the limelight. Plant visits improve employee morale. The public relations program has contributed to labor relations. There is pride in the work and product on display.

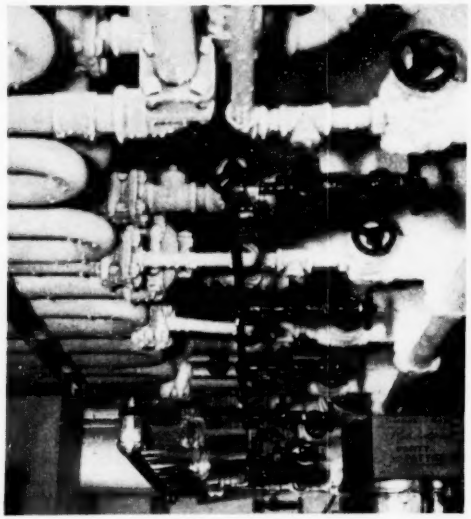
The dairy has no incentive plan based on production rate, except for driver-salesmen. Production speed-up might lower quality. The emphasis is reversed. There is, however, a merit system, based on accuracy and thoroughness, which advances the individual to positions of greater responsibility and higher pay.

All of the present power plant operators were trained in the processing plant and advanced because of their merit ratings. Half of the office employees came from the plant to better jobs, because of effort and ability. Five of the driver-salesmen were formerly laborers in the plant. The two operators who hold the record for the least number of "leakers" on the packaging line are sent to the factory where the packaging machinery is made. There they are given a training course in preparation for advancement to foremanship.

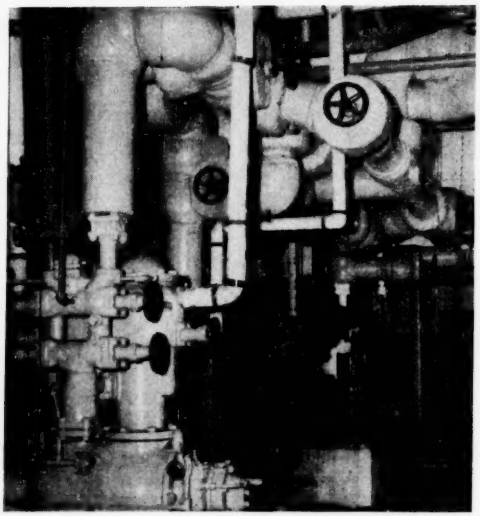
Individuals are trained to assume many of the responsibilities in their departments. Rotating daily from one occupation to another relieves monotony. It is also an advantage to management to have versatile employees with whom to fill vacancies in emergencies. Applications for transfers from one department to another are recognized whenever possible. Transfers are made in accordance with merit ratings when the move represents an advancement for a responsible employee.

Instruction classes for processing department employees are held regularly, and on company time. The purpose is to let employees know the "why" of their duties. Jobs are better done when the "why" as well as the "how" is understood. This is a worthy step away from, "Do it because I say so."

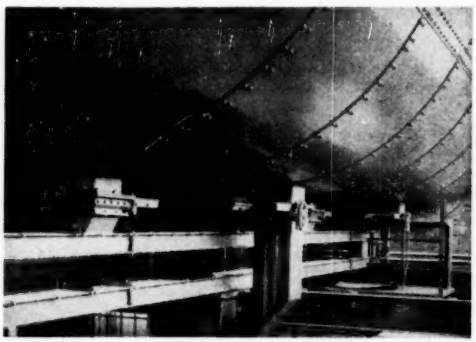
Working conditions in the plant provide for employee comfort, pointing up the fact that management believes employee welfare important. Employee locker rooms, toilets, showers and rest rooms are equal to those in a modern hotel or club.



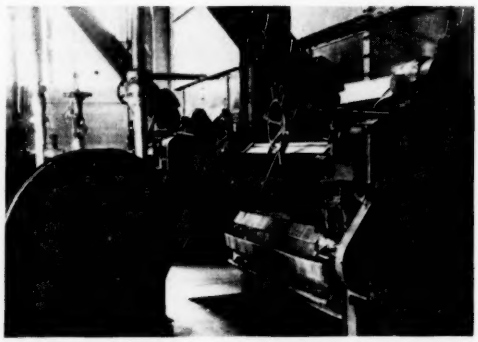
DEFROSTING SYSTEM (black lines) uses hot gas to loosen frost on refrigerating coils of —10 deg. room.



INTERCONNECTING LINES increase flexibility of refrigeration system, permit change-over in an emergency.



DISTRIBUTING CONVEYORS move coal from storage bunker (top) to chutes that feed boilers' stokers.



TURBINE-DRIVEN fans (left) supply air for efficient combustion of coal fed by traveling grate stokers (right).

Advanced Food Plant Engineering Ups Quality and Profits

The 20-fold sales volume increase at the dairy during the 15 years of operation has forced plant expansion—to handle the greatly increased volume of milk, and to provide facilities for processing additional products. This has been more than a mere matter of adding buildings and equipment. The plant expansion had to be engineered to meet the demands of the long range public relations program. This required modern building construction and the application of advanced food plant engineering.

The power plant was designed to supply the needs for processing more than double present capacity. The two 350-hp. fully automatic boilers should meet steam requirements for processing 500,000 lb. of milk per day—the anticipated receipts when present plant expansion is completed. Space has been provided in the power plant for an additional boiler when needed.

Fuel used is barley anthracite screenings. It is dumped from a truck into a pit outside the boiler room, then elevated to a distributing conveyor on the power plant roof, and filled into a 225-ton steel bunker above the fuel end of the boilers. Fuel handling requires no more labor than pressing a button to start the conveyor motors.

Coal is fed by chutes to the automatic stokers, which are of the traveling grate type. The supply of coal, speed of stoker travel, and volume of induction draft from turbine driven blowers, are all instrument regulated. Steam demands of the plant are met with a minimum of labor. Automatic carbon dioxide control instruments insure smokeless, efficient combustion.

Ash handling is also automatic. The ashes are discharged from the stoker and conveyed by steam ejector system to a tile-walled reservoir outside the plant. Boiler feed water preparation and softening is continuous. Proportioning of chemicals, lime and soda, and regulation of flow are automatic.

Periodic daily laboratory checks on boiler feed water determine the balancing with disodium phosphate. Except for adjusting of proportioning pumps to control the

flow, the internal application of disodium phosphate is continuous and automatic.

Back of the feed end of the boilers is a tile-walled observation corridor for visitors. Plate glass windows provide them a complete view of the boiler room.

Quality control in a dairy products plant is as dependent on efficient refrigeration as on the checks of the laboratory. Not only is every precaution taken at the dairy to maintain constant safe refrigeration temperatures, but also to insure against any possible failure in the refrigeration department. Two compressor departments are operated. Each is located beneath and near the processing departments it serves. This arrangement has two advantages: It is possible to group compressors according to type of load, and it saves the cost of piping and reduces the distance refrigerants must travel.

One group of compressors supplies the low temperature demands of the ice cream department—the hardening rooms and frozen product storage rooms. The other compressors refrigerate the milk and cheese processing and storage departments. Though the two compressor departments are separate, the suction and pressure lines of all compressors are inter-connected, so that any one compressor or group of compressors can replace disabled equipment or meet additional refrigeration needs of any department, merely by opening and closing valves.

Automatic controls regulate all compressor operations. They relieve compressors from duty as refrigeration requirements are met and return them to duty to meet temperature variances. The −10 deg. F. storage room and the −20 deg. hardening room are held at their respective temperatures automatically by one compressor, operated by solenoid and thermostatic controls. Ceiling coils supply refrigeration to the −10 deg. room, and an air blast unit maintains the temperature in the −20 deg. hardening room.

When the demand of the −10 deg. room is satisfied, solenoid controls interrupt the flow of refrigerant in the low and high pressure lines. But the compressor continues to serve the −20 deg. room. Controls in the −20 deg. room refuse refrigerant when demands are satisfied. When both rooms are at the desired temperature, the thermostats operate controls, stopping the compressor motor.

Novel Defrosting Methods

The coil-refrigerated storage room is defrosted without temperature change and without an accumulation of water on the floor. Any one of the six banks of coils can be defrosted singly, if the storage room is partly filled. Or all can be defrosted progressively as room occupancy permits. Hot compressed gas, by-passed from the line to the condenser, forces the liquid ammonia from the coils. The hot gas then circulates and loosens the frost. Tapping the coils causes the frost to drop in dry form. Temperature in the room does not allow melting and the consequent formation of water. Defrosting of all coils takes 30 min.

An ingenious method is also employed for defrosting the air blast unit in the hardening room, without appreciably changing room temperature. As the frost melts during defrosting, the water drains through the insulated hardening room wall to the floor of the adjacent 32 deg. storage room and into the drain. The cooler is defrosted weekly. Time required is 30 min. Temperature rise is less than 10 deg. To prevent the temperature from rising above −10 deg. at the end of defrosting, the temperature is dropped to −22 deg. before defrosting.

Five types of cooling systems are used in the dairy. Refrigeration needs and efficiency determined the selection. Direct expansion ammonia refrigerates storage rooms, ice cream freezers, and milk storage tanks. Pasteurized milk is cooled in the cooling section of the flash pasteurizer by the circulation of calcium chloride brine. Sweet water is the cooling medium employed on mix make-up tanks.

Two systems refrigerate cold-wall storage tanks. One uses direct expansion ammonia, conducted through flattened pipes fitted against the inner wall of the tank. The other system uses propylene glycol, which is cooled in a shell-tube heat exchanger by direct expansion ammonia. The cold glycol is sprayed against the inner wall of the tank at the top, and it drains to the bottom, where it is picked up by a pump and returned to the heat exchanger.

In the raw milk cooler, milk flows through stainless tubes which are mounted inside larger tubes. Refrigerated liquid ammonia is circulated between the two tubes. The liquid ammonia is cooled by its own evaporation and circulated by rotary pump through the cooler. This method is very efficient—cost of operations and initial investment are both relatively low.

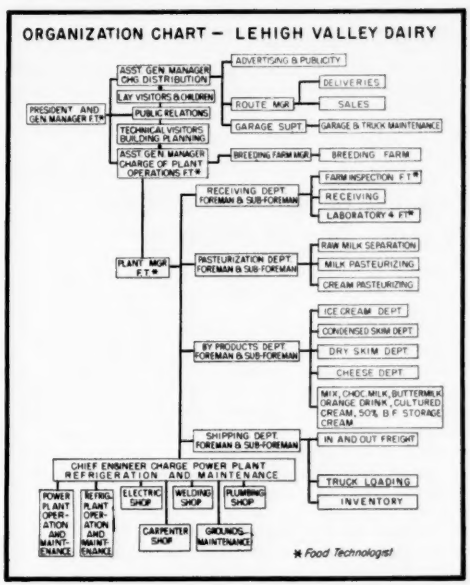
Buildings Well Constructed

Buildings are of brick. Processing room floors are tile. Walls are tile from floor to ceiling, even in the boiler room. Floors and walls of the observation corridors are tiled, too. Ceilings in processing rooms are painted white. Quality control requires that the paint withstand weekly washings with sterilizing solution without peeling or yellowing. Most processing rooms are two-stories high and skylighted. Throughout the plant, as much outside wall space as possible is allotted to windows. Those in the new sections of the plant are double plate glass with air space between. Frames are aluminum.

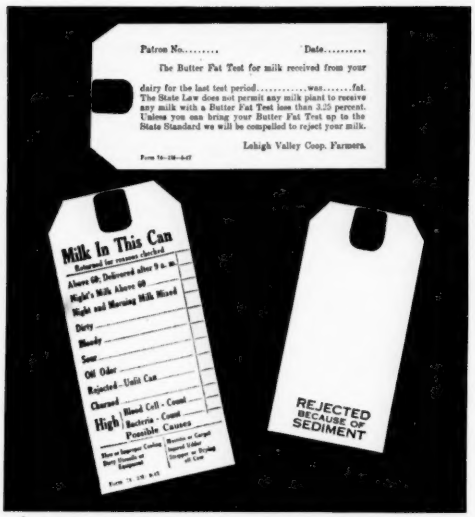
All pipes and conduits are painted, except the stainless steel piping for dairy products. The color designates the contents. This serves several purposes. Errors are avoided, repairs are facilitated, pipes are protected. These pipes and conduits are routed to plant departments through tunnels under the buildings and up to all floors of the plant through wells. They are accessible, yet out of sight and out of the way.

Not only pipes and conduits are kept out of the way but traffic as well. Throughout the plant, passageways and service corridors keep traffic out of work areas.

Technical Men Play Prominent Roles



Poor Milk Is "Tagged Out"


Patron No..... Date.....
The Butter Fat Test for milk received from your
dairy for the last test period.....was.....fat.
The State Law does not permit any milk plant to receive
any milk with a Butter Fat Test less than 3.25 percent.
Unless you can bring your Butter Fat Test up to the
State Standard we will be compelled to reject your milk.
Lehigh Valley Coop. Farmers.
Milk In This Can
Returned for reasons checked
Above 60. Delivered after 9 a. m.
Night's Milk Above 60
Night and Morning Milk Mixed
Dirty
Bloody
Sour
Oil Odor
Rejected—Unit Can
Churned
High
Blood Cell - Count
Bacteria - Count
Possible Causes
REJECTED BECAUSE OF SEDIMENT

REJECTED MILK is tagged to indicate precise reason why, then the cans are returned to the shipper.

Monthly Public Health Reports of City of Allentown

1948	Average Bacteria Count, Pasteurized Milk		Average Bacteria Count, Pasteurized Cream	
	11 Dairies Distributing in Allentown	Lehigh Valley Dairy	11 Dairies Distributing in Allentown	Lehigh Valley Dairy
January	38,000	3,800	13,000	1,900
February	32,000	5,600	28,000	1,500
March	44,000	7,000	22,000	1,000
April	36,000	6,300	41,000	1,100
May	47,000	6,300	36,900	1,100
June	31,000	3,400	41,000	3,200
July	46,000	7,200	41,000	4,200
August	27,000	4,500	35,000	14,000
September	28,000	4,700	26,000	16,000
October	27,000	1,900	21,000	1,800
November	19,000	1,400	16,000	600
December	23,000	3,400	17,000	300

Samples for Health Department Analyses were taken from retail stores, restaurants and delivery trucks.

EFFICACY of Lehigh's bacteria-control program is demonstrated by actual count. This dairy scores a low 4,600 average for milk, 3,900 for cream—far under overall City averages of 33,000 and 26,500, respectively.

Progressive Quality Control Extends Beyond Products

Quality control in a food plant, especially one which processes dairy products, depends on more than a well equipped laboratory. There are five components in adequate quality control. The relative importance of each depends on the size of the processing operation.

First of these is know-how. Quality and sanitary regulations of state and municipal health departments make know-how necessary. In the milk industry it means scientific training, or the equivalent in experience. As the size of the processing operations increases, problems of quality control become more numerous, more complex. Scientific manpower must increase in proportion to the increase in problems. Need for scientific personnel is not confined to the laboratory but includes the functions of management. Adequate scientific manpower is the second component.

The third is a laboratory with sufficient equipment and scientific personnel to perform the multitude of routine analyses that vigilant control requires. The fourth is competent employee training which results in employee cooperation. The larger the processing operation, the greater the chance for error on the part of the individual; therefore, the greater the need for the kind of instruction that instills understanding and generates cooperation.

Last component is the right structure of management—for a structure which assigns responsibility without authority shackles quality control. Preserving quality is the function of the processing departments. Unless the administration of all the functions which influence control is invested in the management of the processing departments, the attainment of quality standards is never assured. The components of quality control are adequately balanced at the Lehigh Valley Dairy.

The organization structure (Chart P. 73), shows that all the functions which affect or contribute to quality are directly controlled by plant management through the processing departments. The chart also indicates the extent to which scientific personnel is used throughout the organization—from the president to farm inspectors. Know-how is ample, derived from both scientific training and experience. The laboratory is modern, well equipped, competently staffed. Maintenance of quality standards proves the cooperation of employees and efficiency of the control methods (see Table at left).

Eleven organizations distribute dairy products in Allentown. There are, in neighboring areas, several times that number whose products aren't permitted in Allentown because they do not meet this community's quality standards, which are not only above those of adjacent areas but more rigid than those of nearly every other area in the state.

Push Quality Standards Still Higher

Trend of quality in the food industry has been up. Speed of improvement has depended more on developments within the industry than on outside influence. When one processor develops a method for bettering his product, competition forces others to meet that quality. Only when it is demonstrated that better quality can be attained does that quality, through voluntary action or compulsion, become the standard which must be met by all processors.

Rigid requirements for dairy products, established by the Allentown Public Health Department, were possible largely because of the standards required of the members of the cooperative who supply milk to the Lehigh Valley Dairy.

Level of quality on the farm is maintained through the dairy's farm inspection program (which includes scientific aid to the farmers), and also by the improvement of herds through the dairy's artificial insemination center. The dairy's own in-plant quality control has formed a base on which to establish dairy product standards for Allentown.

How Quality Is Controlled

All milk received is produced on farms of members of the cooperative and trucked to the plant in 10 gal. cans. These farms are located within 30 miles of the plant. Two quality control checks are made on every can of milk as it enters the plant. Milk with a temperature above 60 deg., unless delivered before 9 a.m., is not acceptable, neither is milk with an "off" odor. These checks are made by a technologist from the laboratory.

Milk above the temperature limit or with off-odor is set aside. A smear is taken of each off-odor can and a micro-bacterial analysis made immediately. A reject tag

is wired to the can, which is then returned to the shipper. The tag advises the probable cause of the off condition as determined by analysis. Milk from acceptable cans is dumped into a weigh-tank. The total milk from a shipper is sealed and a composite sample drawn for butter-fat determination.

Twice a month, a random sample of every shipper's milk is taken for sediment test. If the sediment is high, the can is rejected and other cans of that shipper are sampled. Filter pads are filed for shipper inspection and as evidence.

All cans which fail the sediment test are set aside, tagged as rejects, and returned to the shipper. When cans of a shipper have been rejected and returned because of sediment, daily tests are run on his milk until the condition is corrected.

Milk rejected because of excessive sediment may have an acceptable bacteria count and be otherwise satisfactory. Sediment indicates faulty sanitation at the farm. If not corrected, this may in time increase the bacteria count of the shipper's milk and influence the average of the plant. The sediment test is a check on farm sanitation. It is preventive control.

For this test, a pint sample is drawn from the bottom of a can. This removes most of the sediment. The remainder of the milk in the can may pass the test.

During the first years of operations, some farmers took a chance that little or no sediment was left in the can after the sample was drawn. They refiltered the rejected milk, or mixed it with the next day's shipment, proportioning some of it to each can. This worked for a while, and the offenders grew cocky. They boasted to other shippers, implying plant control was superficial.

Outwitting the Milk Mixers

This mixing practice soon ended, however, with disastrous results to the offenders. For in 1936, the control department started a procedure which has curbed such mixing ever since. Whenever a can of milk is rejected because of excessive sediment, or for any cause that cannot be readily checked by a microscope, a small amount of soluble starch is added to the can, just enough to produce an iodine reaction if as much as one quart of the rejected milk is added to 10 gal. of fresh milk. Every can of a shipper's milk is checked during the days following a reject. Cans which respond to the iodine test are rejected. So mixing of reject milk is rare today. Farm sanitation is much improved as a result.

And now, here is an example that establishes the value of an organization structure which relegates authority with responsibility. The dairy is the joint property of the farmer members of the cooperative. Quality, however, is the responsibility of the departments of the dairy which receive and process the milk. Fortunately, that responsibility is coupled with authority to prevent the selfish interest of an individual, group or department in the organization, from interfering with the production and processing departments in maintaining quality standards.

Not even a member of the board of directors can revoke the decision of the quality control department regarding the rejection and return of milk from his own farm. This has been proved. If quality standards are not met, milk from farms of members of the advisory committee and board of directors is rejected and returned the same as that of any other shipper.

An actual direct-count, micro-bacterial analysis of a composite sample of each shipper's milk is made at least three times per month. It is doubtful if this control method is practiced in many other dairies. This direct-count analysis is made oftener on the milk of those shippers whose counts have been running high. This requires as many as 3,000 analyses per month, but the method is rapid as well as accurate. It not only indicates off quality but points to the cause.

If the count is too high for any sample, all the cans of that shipper's milk are set aside the next day until micro-bacterial tests are made on each can. Cans with unsatisfactory counts are rejected and returned. Farm inspectors are immediately dispatched to aid in locating the cause of the high count. Daily checks of every can of that producer's milk are continued, and the off cans rejected and returned, until the bacteria count of all cans is satisfactory.

As a part of in-plant control, 48-hr. incubation plate counts, for thermoduric bacteria, are made twice a week on all storage tanks. Similar tests are made on the milk of each producer twice a month, as a further check on sanitary conditions at the farm. These are followed by farm inspections, as necessary.

Another in-plant check is made for proper control of pasteurization. This check, the phosphatase test, is made once or twice a week. *E. coli* tests are made three times each week. In the event of a complaint, both *E. coli* and phosphatase tests are made immediately. Positive *E. coli* tests are followed by line tests to locate the cause of contamination. This qualitative fermentation test is a check on the thoroughness of cleaning and the completeness of sterilization, and it locates contamination beyond the pasteurizers.

Prevention By Education

In-plant control is not confined to laboratory testing. Prevention is better than cure. A high degree of preventive control is attained through regular employee-training classes. In these informal classes, the reasons "why" are discussed, and often illustrated.

On one occasion, the plant manager discovered fresh evidence of spitting, in violation of a plant rule, on a drain near a drinking fountain in an observation corridor. The plant manager gathered the evidence on a paper towel, and called a meeting of the employees. Little would be gained by asking *who*; much was gained by demonstrating *why not*. He prepared slides from the evidence and brought them under microscopes for the employees to observe.

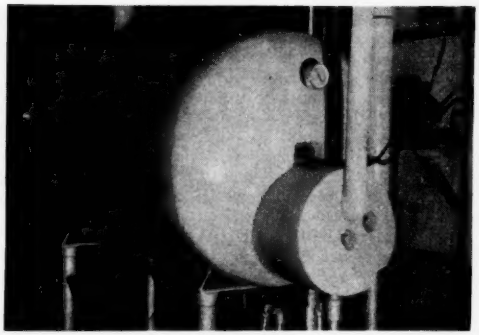
As often as possible, results of faulty sanitation are demonstrated to employees as well as explained to them. They are called in to watch while *E. coli* and phosphatase tests are made and explained. They inspect many slides under the microscope. They are taught as much technology as they can absorb.

Solutions used for each cleaning operation are determined by the laboratory, which provides each department with a formula for preparing the cleaning solution. Immediately after milk is dumped, empty cans enter the can washer. They are first washed with hot water, then with a solution made of a sulphonated alcohol wetting agent, sodium metasilicate, sodium metaphosphate and a quadraphosphate sequestering agent. After the cans are washed with cleaning solution, they are steam sterilized and dried in a stream of hot air.

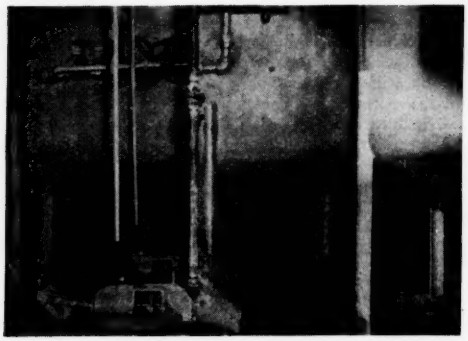
All processing equipment is cleaned and sterilized immediately after use. Cleaning includes brush scrubbing. The solution for cleaning equipment is made to the dairy's formula. It contains soda ash, sodium metasilicate, sodium metaphosphate, a quadraphosphate sequestering agent and a sulphonated alcohol wetting agent. After a hot rinse the equipment is dried. All equipment and lines are sterilized immediately before using again by washing or soaking in a hot solution of quaternary ammonium compounds, 200 to 250 ppm.

A similar solution is pumped through the flash pasteurizer and pipe lines. Joints are loosened sufficiently to permit the solution to reach all seats and threads. After

This Kind of Engineering Brings Notable Economies



PROCESSING WATER is thriftily heated by exhaust steam in this shell-and-tube heater. Source of steam is turbines which drive blowers in engine room.



LIQUID PARAFFIN is conveniently maintained for coating paper bottles. Employed are these insulated tanks heated by exhaust steam from turbines.

each sterilizing operation, a sample is taken by the department foreman for the laboratory to check. This insures employee accuracy in preparing the solution to correct strength. When sterilization of equipment is complete, the remainder of the solution is used for washing plant floors and also for washing the inside of delivery trucks. A fresh solution is prepared every time equipment is to be sterilized.

Floors and equipment in the processing departments are hosed at any time that dairy products are spilled or splashed on them. Floors are washed and sterilized following the sterilizing of equipment. All floors in offices, dairy bar, corridors, etc., are washed, waxed or polished daily, depending on the nature of the floor. Service corridors and the dairy bar are scrubbed by wet vacuum method.

The solution for daily cleaning of floors contains sodium pyrophosphate and a sulphonated wetting agent. The same solution, diluted, is used for washing walls and ceilings. Other ingredients, used for making the cleaning solution for equipment, are omitted because of the white residue left after drying. Walls are washed weekly, ceilings as necessary.

At least three times daily, samples of water are drawn from the boilers for laboratory analysis. The balancing of disodium phosphate and the boiler feed water softening agents is controlled by the laboratory, which also checks all the plant's ingredients and supplies.

Paper and Paraffin Carefully Checked

Even the paper from which the paper bottles are made is tested by the laboratory. This paper, which is processed to plant specifications, must contain no starch. The wax in which the containers are dipped is also made to formula. The paraffin must contain an added amount of microcrystalline wax.

All products of the dairy are packaged in non-returnable paper containers. With the exception of bulk ice cream containers and nested cups for cottage cheese, all are formed and wax-dipped at the plant. "Leakers" are rare. One in 6,000 is the present plant average. The objective of both management and employees is to get the average down to 1 in 10,000 for 1949. If a leaker reaches the trade, it is serious. Quality control over packaging is rigid. The responsibility is on the employees who operate the machines.

When blanks, from which the bottles are formed, are stacked in the machine feed, the operator draws a colored pencil along their edges. Each man on each packaging line is assigned a color. The color marks, on what becomes the corner of the bottle, are made before the bottles are dipped in wax. These marks cannot be removed. They identify but are not noticeable.

Before this control measure was introduced, the percentage of leakers was high. The responsibility could not be traced. It was always the machines that were at fault! But as soon as the colored pencil method was introduced, responsibilty for leakers was traceable to the individual, and leaker percentage decreased immediately. This control not only keeps leakers at a minimum but is now the basis of a merit system which awards for quality, not for speed and volume.

How Efficiency and Economy Reduce Operating Costs

When one who is familiar with a variety of food plants visits the Lehigh Valley Dairy, the first reaction is surprise. The extensive building in a groomed setting, the formal lobby and sweeping auditorium, all appear like a municipal project. The plant appears extraordinary for a food plant, almost extravagant. When the other parts of the dairy are visited—processing departments, power plant, garage and warehouse—efficiency and economy are apparent. When one understands the objectives of the public relations program and tallies the results from the records, the whole pattern becomes homogeneous.

Efficiency and economy of the steam generation and refrigeration departments should be evident from the discussion in the section on Advanced Food Plant Engineering. These departments are efficient. They provide process steam and refrigeration, automatically controlled, to adequately safeguard the quality of the products. The chances of human error are removed. Labor requirements are low. Efficiency and economy are encountered consistently throughout plant operations.

Exhaust steam from the turbines driving the forced draft fans heats water for processing, by means of heat exchangers. The steam heats the building in winter, and maintains the paraffin used in packaging at the desired temperature.

This wax is delivered to the plant by tank truck and emptied into one of two 50,000-lb. capacity insulated tanks. It is held at a uniform temperature in these tanks by instrument control. Two specially built, steam jacketed

proportioning pumps deliver a measured amount of wax to the packaging machines. Pipe inter-connections, and adjustable piston strokes on each pump, permit either to relieve the other or to do double duty in case of breakdown or shut down for pump adjustment.

Float valves, on the wax reservoirs at the packaging machine, accept only enough wax to maintain proper levels. A by-pass relief valve returns excess wax from the proportioning pumps to the heating tanks when packaging machine needs are satisfied.

All liquid wax lines are traced with steam lines. The two are jacketed in insulation. Any wax in the lines at the end of operations is returned by gravity to the heating tanks by admitting air from valves at the top of the lines. Use of the liquid reduces labor required to unpack the cake-wax from the cartons and the time for loading wax chambers and supervising melting. It also reduces the cost of molding, cooling and packaging cake-wax at the refinery, with a corresponding lowered cost to the dairy. This system supplies packaging machines with the desired amount of wax at unvarying temperature and at a lower cost.

Non-Returnable Bottles Used

Efficiency in controlling leakers in the packaging department—to keep them to the low average of 1 in every 6,000 bottles filled—has reduced packaging costs. It has reduced the loss of product and also preserved customer goodwill. Management points to many other economies in the packaging department through the use of non-returnable paper packages. Included are these savings: Capital investment in bottle washing machines, and the space they would occupy; cost of labor necessary fo attend and clean washers, and the cost of up-keep while operating them; in-plant handling expenses, and storage space; and also economies through increased loads per truck and minimized time for delivery, which release drivers for more selling activities.

Forming of paper packages in the plant results in an accumulation of paper scrap, which is baled and sold. It may be pointed out that warehouse space is limited, and will be until the expansion program is completed. Portable conveyors are used because the space permanent conveyors would occupy can be used for the storage of merchandise.

Refrigerated storage space is also limited, awaiting the completion of additional rooms. This storage is compensated, in part, by the use of two compressor refrigerated trailers, which serve as storage rooms for the overflow.

An economy which is anticipated but not yet accomplished is the dairy's own laundry—included in the expansion program. It should be in operation within the year.

Indirect Economies

There are several economies which benefit indirectly. One of these is the Dairy Herd Improvement Center, which last year, through artificial insemination, bred approximately 12,000 cows belonging to the cooperative's members. This is an economy to be collected on through the years. Improvement of herds increases butterfat content of milk. The higher the butterfat content, the higher the dollar yield per man-hour, per operating hour and per unit cost of overhead.

Use of route supervisors as guides for visitors is both a direct and indirect economy. It saves the cost of permanent guides, also the time of plant officials, a direct saving. By serving as guides, route supervisors become thoroughly familiar with processing methods, the reasons for quality control and sanitation, and the methods of obtaining both. Who is better equipped to sell than the man who knows his product in all its lay and technical aspects? Serving as guides for visitors improves the sales ability of the supervisors and their ability to train others.

Only milk and cream were processed when the dairy first started operations. But the dairy's function is to process and market the entire production of the cooperative's members. And the flow of milk, from the farms, varies with the seasons; the demand varies also. For this reason a byproducts plant was added to balance milk production with market demand. Products processed are: Condensed skim milk and condensed sweetened skim, edible dry milk and dried milk feed, ice cream and ice cream mix, cultured milk and cream, cottage cheese, and frozen 50 percent butterfat cream.

Skim milk is condensed (3½ to 1) in a 10,000-lb.-per-hr. capacity vacuum evaporator. The finished product is run into 10 gal. milk cans. It may go direct to fill orders from bakers, confectioners or other ice cream manufacturers, or into refrigerated storage. The same is true of sweetened condensed, which is run into barrels.

Skim milk is also processed to dry milk on a 4,000-lb.-per-hr. double-drum dryer. It is packed in 175 lb. fiber drums. Dry milk is processed in two grades—an edible grade that is sold to the food market, and feed grade, made from returns brought in by the driver-salesmen from the routes. This product is sold to members of the cooperative for feed.

All Products Are Dated

As a part of the quality control program, all products are tagged, stamped, or otherwise labeled to designate the contents and the date of pasteurization. The identifications are either attached to the container or printed on it immediately after processing—to remain with it when delivered. This procedure is followed on all products, whether prepared for the industrial, wholesale or retail trade. It provides assurance to the purchaser, and a means of quickly and justly settling any controversy. By this method, responsibility for an error in the plant can be traced directly to the individual.

Stamped on every bottle of milk are the words "not to be sold after. . ." As the bottles are closed in the packaging machine, the name of the last day the milk can be sold is stamped on each. For example, milk, bottled between Monday 7 a.m. and Tuesday 7 a.m., has Wednesday stamped on the container as the last day for sale. This dating is not required in the area in which the dairy distributes; it is a voluntary safeguard that guarantees to users the freshness of the product. It also prevents retail stores from selling stale milk.

Past-date milk is picked up by the drivers and brought back to the plant. Here, it is assembled, and a red tag is attached to any tank or can containing returned products destined for processing into feed. Cream is separated from returned milk and the skim is dried. Not only is skim milk from returns dried for feed, but also other products returned from the routes—cultured milk and cream, chocolate milk and orange drink. Withdrawing past-date products from stores protects the quality reputation of the dairy. Processing returns to feed converts a loss into a saleable product.

Ice Cream Also Made

Surplus cream may be run to 50 percent butterfat content, frozen and stored. This can, in part, be absorbed by the ice cream department or sold, at a time of market demand, to other ice cream manufacturers. The ice cream department plays an important function as an economic balance. It can draw on dairy products in storage—50 percent butterfat cream, condensed skim or dry milk—or it can absorb part of the daily surpluses as they occur.

The type of product into which surpluses are proc-

essed depends on economic forecasting by the production department. Such forecasts are based on season, inventory and standing industrial orders. Past sales and plant needs enter the planning, too. The byproducts plant makes it possible, not only to balance supply and demand, but also to obtain the maximum return on the total raw material.

The Structure and Operation Of the Farmers Cooperative

In January 1949, membership of the Lehigh Valley Cooperative Farmers was 1,866. Each member must be a farmer, "engaged in agriculture." To become a member, each one made an application which was approved and accepted by the board of directors. Each member, at the time of acceptance, purchased one or more shares of stock at $60 per share. As a member, each is entitled to the use of the dairy's artificial insemination breeding farm.

Only those can ship milk to the dairy who apply to become shippers, who live within 30 miles of the plant, and whose farms pass the inspection requirements of the quality control section of the production department—and only then when sales volume justifies including additional shippers. Each shipper, to qualify, must also sign a marketing agreement which specifies that none of the milk produced on his farm be sold except to the dairy. There is a penalty for voiding the agreement short of a specified time period. In January 1949, 609 members were shippers.

Membership is divided into eight groups or locals. These locals elect one member to the advisory committee for every ten members. The committee serves as advisory intermediary between the members and the plant, between the members and the board of directors, and between management and the board. The board serves as the executive body of the organization.

The board is nominated by the advisory committee and a seven member board elected to a three year term of office by the membership in secret ballot, one vote to the member regardless of shares. Plant management is appointed and hired by the board and can only be displaced by that group, to which management is directly responsible.

Quality Products and Key Men Behind Them

"FAMILY PHOTO" shows Lehigh's wide range of attractive packages. All are one-trippers.

IT WAS President G. A. Boger (second from left) who originated Lehigh's foresighted public relations program. On his left, respectively, are operations executive F. M. Greenleaf, who engineered the dairy to fit the plan, and distribution chief C. S. Dutton. The latter, with the aid of plant manager R. F. Lesh (far left), directs the operation.

Plant Management's Duties

Plant management is authorized to operate the plant, to determine quality, to plan and supervise methods, schedule the selection of products to be processed, and to market and distribute them. Management collects payment for products sold, pays all operating costs, and pays the members for their milk. All these functions are without interference.

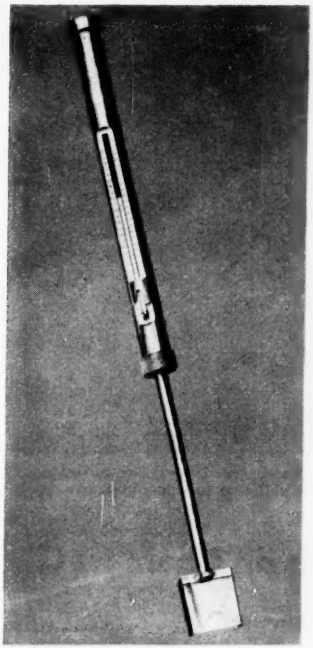
Management is authorized to purchase all supplies—containers, ingredients, fuel, gasoline, etc. The board must, however, authorize the purchase of capitalized equipment, such as plant equipment or additions to the fleet of trucks. So long as there is a margin between the plant's indebtedness and the debt limit permitted by the membership, the board can authorize capital expenditures for equipment. Only the membership, by vote, can authorize an increase in indebtedness. Votes on this issue are by shares of stock held by each member.

If management considers it advisable to expand plant processing facilities to such an extent that the cost will be beyond the authorized limit to plant indebtedness, a proposal is submitted to the board. Then the board submits the proposal to the advisory committee for study. After study, this committee presents the proposal to the membership with recommendations. The membership decides by ballot.

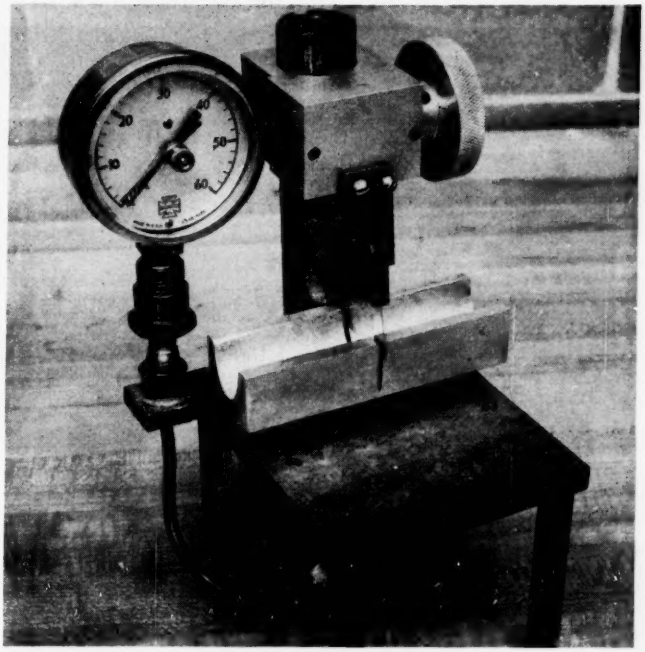
The total amount from sales determines the amount distributed to shippers. After all plant operating costs are deducted from revenue received, the remainder is proportioned among members according to hundredweight and butterfat content of their milk. This is calculated on the basis of hundredweight received plus or minus 6c. per point for butterfat content above or below the basic figure of the plant, which at present is 4 percent.

Fifteen cents per hundredweight is deducted from the monthly payments due each shipper. The total thus deducted is applied to plant indebtedness. In return, shippers are issued the equivalent amount in common stock, which pays 6 percent. The farmer members thus provide the capital investment necessary for expansion. They receive stock in return—which few ever willingly sell. They also derive a much better return for their milk than their nonmember neighbors. In the event that a member does want to sell a part or all of his stock, it can be transferred by permission of the board, but can be disposed of in no other way.

Today, the co-op farmers are planning new investments in plant expansion—definite evidence that they are convinced of the soundness of the plan.



New pressure-scale knife . . .



. . . and dial-gage cutter are—

Quick Recorders of Fibrousness in Asparagus

These devices measure pounds of pressure required to sever samples of raw or processed stalks. Findings accord with organoleptic ratings

AMIHUD KRAMER, I. C. HAUT, and L. E. SCOTT
Department of Horticulture, University of Maryland
and L. E. IDE
Production & Marketing Administration, U. S. Department of Agriculture

Two recently-developed instruments furnish a rapid, easily-applied objective method for determining the fibrousness of both raw and processed asparagus—a valuable check in assuring quality of the final product.

First new device is shown above in the left photo. It is an adaptation of the pressure tester commonly used for measuring firmness of fruits. As will be seen, it employs a stainless steel knife (.017-in. thick) fitted to a plunger-type shaft. The pounds of pressure required to cut a stalk of asparagus are indicated by the scale on the plunger tube.

The other instrument (right photo) has a similar cutting arrangement, but here a dial gage records the pressure required to sever the sample. Results obtained with the two instruments are quite alike. However, the gage piece provides somewhat lower values for tender asparagus.

The equipment was initially developed at the Department of Horticulture of the University of Maryland. Here, 66 samples were prepared with the new instruments by cutting 1-in. pieces of stalks in the middle. Then these samples were sorted into a series in terms of pressures and diameter sizes. Next the samples were cooked and rated organoleptically. And then they were analyzed for fiber content.

Resulting correlations indicated that there was generally good agreement between fiber content, pressure values, and organoleptic ratings.

When correlations were obtained for different sizes separately, they were invariably higher. This indicated that the diameter of stalk was a significant factor, particularly in the relation of pressure readings to organoleptic evaluations of fibrousness.

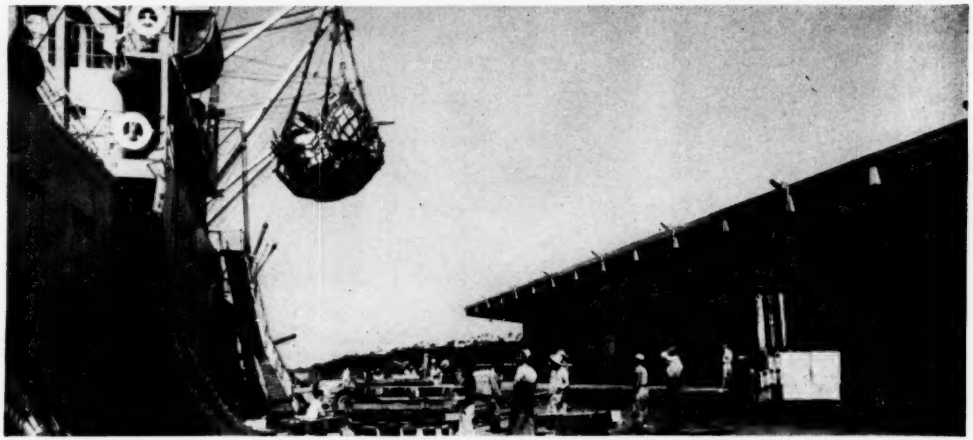
Then, during the 1948 season, over 200 samples of asparagus were prepared in Maryland, Delaware and New Jersey. A portion of each sample was analyzed in the raw stage and the remainder was preserved for study in the canned and frozen state. Pressure readings on these samples were obtained by the use of one or both of the instruments illustrated here.

Where Readings Were Taken

A minimum of 10 readings was obtained for each sample. The average value was used in the correlation analyses. For samples of tips and snapped stalks, the pressure readings were obtained about ½-in. from the butt ends of the stalks. For samples of cuts, the pressure readings were obtained about the middle length of

(*Turn to page* 180)

Ships bring food to dock side of warehouse . . .



VESSEL UNLOADS cartons of food at dock built conveniently along one side of the big warehouse. Canopy extending along structure provides shelter from weather. Electric lift trucks carry food from ship-side to cold rooms.

Advanced Cold-Storage Warehouse Built on Guam

Uncle Sam's largest off-continent food-storage facility is engineered for efficiency and product protection. Has dehumidifying corridor

G. ELMO HOLKE
Editor, "The Constructionaire," Guam, M. I.
(Photos by Hugh Carey)

Better service and better living for the people on Guam are provided by the huge and highly efficient cold storage warehouse completed recently on the eastern shore of Apra Harbor. The warehouse, the largest owned by the government outside continental United States, incorporates advanced design and operating features.

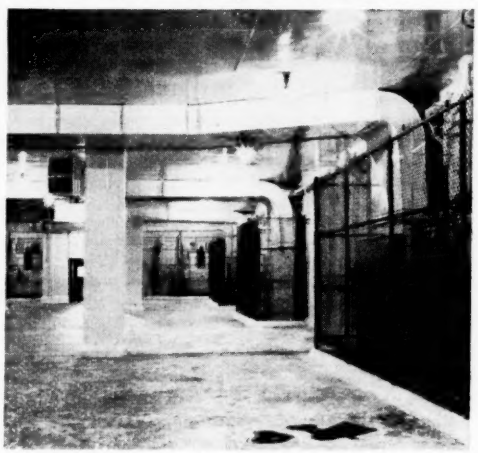
In addition to low-temperature and sub-zero rooms, the big warehouse includes offices, dressing rooms, machine rooms and a battery-charging building. Located at one end of the main building, the offices are air conditioned and equipped with water coolers. The dressing rooms and showers are on the floor above the offices.

There are six 32-deg. storage rooms and two deep-freeze rooms with a —10-deg. temperature. These rooms are connected by a dehumidifying corridor located on the delivery or truck-loading side of the building. The ceiling height of the cold section is 15 ft. And there is attic space above the ceiling to accommodate the large dehumidifying system.

To provide convenient docking facilities, the warehouse was built at the water's edge on a 9-ft. fill made with coral dredged from the harbor bottom. Foodstuffs for storage are received from boats, brought in through an air lock to reduce refrigeration loss, and transported to the cold rooms. Foods to be distributed are taken out through the dehumidifying corridor to avoid moisture condensation on the containers as a result of too abrupt a change in temperature. Handling of materials is done efficiently with electric fork-lift trucks. The building was designed for that, and the first-floor elevation is graded so that the trucks can operate between ships and the building without climbing ramps. Supplies coming into and leaving the warehouse are protected by a 20-ft. canopy, or roof projection, on both sides of the building.

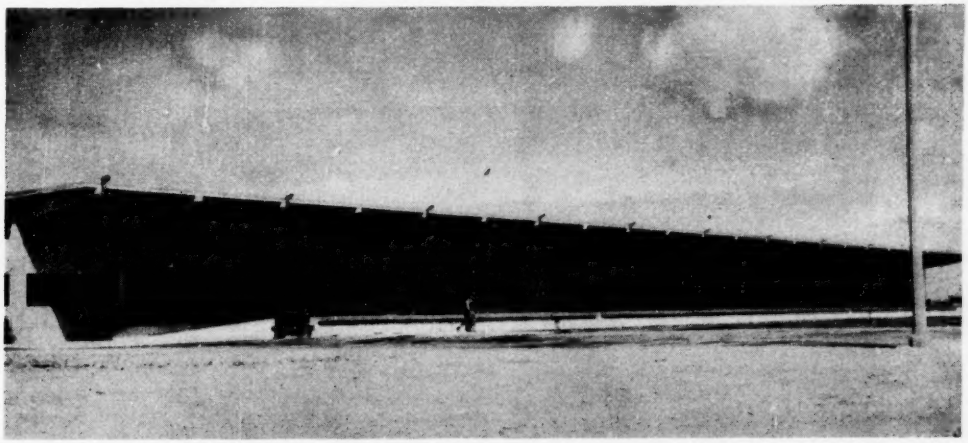
The refrigeration system is a combined single- and two-stage ammonia compression type, using ten vertical single-acting machines. Five of these operate on the low temperature system, 5-psi. suction pressure and 35-psi. discharge pressure. The discharge gas from these five compressors

Food is stored in refrigerated rooms . . .



CEILING HEIGHTS of 15 ft. permit high stacking of pallet loads. There are six 32-deg. and two —10 deg. rooms.

. . . and outgoing food is loaded from platform on other side



ON OPPOSITE SIDE of warehouse is a platform from which outgoing shipments are loaded onto trucks by electric lift trucks. On the side, too, is a canopy to shelter the food. Handling of foodstuffs is particularly efficient.

passes through a refrigerant-cooled intercooler and, with vapor from the high-temperature system, goes to the other five compressors operating at 35-psi. suction pressure and 185-psi. discharge pressure.

Discharge gas from the high-pressure stage is cooled and liquefied in the six shell-and-tube condensers. Three receivers collect the liquid ammonia for distribution to the cooling units. The intercooler is equipped with a coil to subcool the liquid used in the low-temperature cooling units. The suction lines are provided with liquid traps which are equipped with liquid-ammonia heating coils to evaporate any liquid coming from the cooling coils so as to keep liquid "slugs" out of the compressor. Oil is removed from the compressor discharge gas by impact-type oil traps in the discharge lines.

Temperature regulation is effected by pneumatic controllers which operate the solenoid shut-off valves in the liquid and suction lines. Back-pressure regulating valves provide minimum-temperature control. The cooling room units include both finned and bare pipe coils, some of which are nonfrosting. Salt water for cooling purposes is obtained through a tunnel leading out to the bulkhead.

No fewer than 88 floor drains are used in the building's well-designed drainage system. On the roof, the drainage system is located on both sides and is connected by a trunk line. Sewer lift stations take care of both drainage systems. Two complete fire systems are provided, one using fresh water, the other salt water.

Six to eight inches of spun glass insulation was used between the subfloor and the finished floor, as well as in the walls and ceilings. Transite and concrete bumper block cover the insulation inside the building, making the building fireproof. The cold storage warehouse was the first building on Guam to use precast roof slabs. These slabs were made at the job site and cured by a vacuum process.

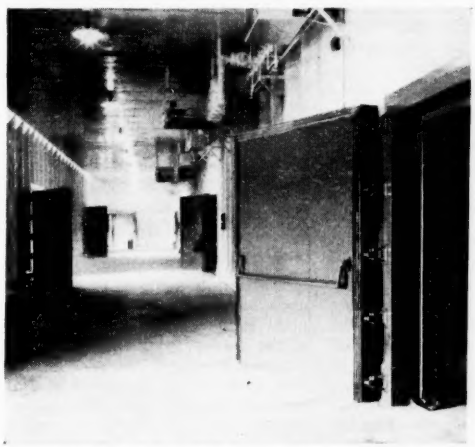
The main building is supported by 2,700 wood pilings, designed to carry 20 tons apiece. Columns supporting the sub-floor have a 3-ft.-thick footing which rests on from 9 to 14 pilings, and the top of each column is flared. Special piling provides each piece of equipment in the machinery room with a separate foundation. This construction prevents transmission of vibrations.

To provide an insulating dead-air space under the subfloor of the refrigerated area, the 6-8-in. subfloor was poured on a loose backfill which settled away from the concrete. Therefore, the subfloor is practically a floating floor, resting only on the columns.

Facilities for charging the lift-truck batteries are provided in a specially designed building behind the cold-storage structure. In addition to the battery chargers, the electrical load includes 1,000 hp. of motors and a 90,000-watt lighting load. Electric power for these purposes is supplied from a 13,800-volt transformer vault.

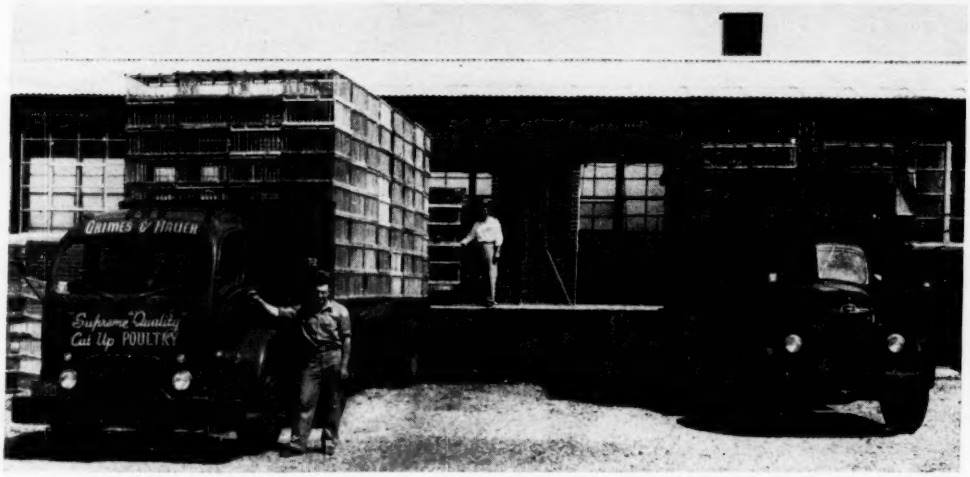
Sea water is dammed from the warehouse site by a concrete wall and steel sheet piling. Three steel tie rods, spaced 60 ft. apart anchor the bulkhead to concrete "dead men." In front of the bulkhead, large wooden piles were driven about 4½ ft. apart to act as fenders. An idea of the difficulty of building the bulkhead may be gotten from the fact that some of the "A" piling was driven to a depth of 120 ft. before "refusal" was reached.

. . . then removed via drying corridor



CONDENSATION on products brought out of cold rooms for delivery is prevented by dehumidifying corridor.

Live Poultry is Hauled to Plant by Trailer and Trucks



GEARED to plant operations, incoming shipments of chickens are made by tractor-trailer and smaller trucks.

Truck Fleet Builds Business in Fresh Poultry

Chickens processed in eastern Pennsylvania are delivered as far as Cleveland, Boston and Louisville by company's own well-regulated fleet

ITS own automotive fleet of ten power units and two semi-trailers has been the vital distribution link in the substantial growth of the Grimes & Hauer fresh cut-up poultry business. From a small beginning 17 years ago, this company has expanded so much that it recently built a modern $150,000, processing plant at Fredericksburg, Pa.

Pennsylvania's Fredericksburg is about 50 miles northeast of Harrisburg, in the Blue Mountain area of Lebanon County. The plant's source of supply comes from over a hundred surrounding, carefully selected, meticulously managed Pennsylvania farms. Most of the chickens are crossbreeds which bring out the best eating qualities of New Hampshire Reds and Plymouth Rocks. The plant also processes turkeys, ducks, geese and rabbits.

Trucking Geared to Processing

To maintain the plant's production flow line—for which the schedule is 10 minutes from the time a live chicken arrives at the unloading platform until it is processed, iced and barreled, and ready for shipment—it is necessary to set up rigid incoming delivery schedules.

Three of the company's units, two trucks and one tractor-trailer, are assigned exclusively to this incoming supply work. All are fitted with flat-bed, open bodies. A Chevrolet 1½-ton truck with a 12-ft. body carries 128 crates, or 2,250 chickens. An International Model KB-7 truck, with a 15-ft. body, carries 160 crates, or 2,880 chickens. The third pick-up unit in the fleet consists of one of the newest 1949 White cab-over-engine tractors, with the tilting cab, and a 24-ft. Fruehauf trailer. It carries 256 crates, or 4,648 chickens.

Chickens Are Packed in Barrels

After processing, the chickens are packed in barrels between layers of freshly flaked ice, the latter being used because it is 20 percent lighter and gives a 4-deg. lower temperature than crushed ice.

The barrels are then moved by an electric industrial truck—fitted with a new type of time-saving curved lifting arms—to the company's waiting outbound delivery trucks, or to a cold room where a constant temperature of 33 deg. is maintained. The poultry is never permitted to freeze. Consequently, it goes to market farm-fresh.

While the product is branded "Supreme Quality Cut-Up Poultry," the chickens are shipped whole from the plant and cut-up as desired at the retail outlet. In some cities, inspection laws require that inspectors see the whole chicken. And customers can purchase whole chickens if they prefer.

None of the Grimes & Hauer poultry is sold to commission houses. It all goes to the company's own retail stores or concessions, of which there are 40. Fourteen of these are located in Washington, D. C. There are three in Boston, Mass., and two each in Providence, R. I.; Arlington, Va.; Pottsville, Pa.; Pittsburgh, Pa., and Cleveland, Ohio. One retail outlet is located in each of these towns: Brockton, Mass.; Pawtucket, R. I.; New Haven, Conn.; Alexandria, Va.; Bethesda and Silver Springs, Md.; Easton, Philadelphia and Erie, Pa.; Buffalo, N. Y.; Columbus and Cincinnati, Ohio, and Louisville, Ky.

Seven-Truck Fleet

The relative locations of all of the above outlets to each other, and to the plant in Fredericksburg, are shown on the accompanying map of the distribution territory. Without dependence upon railway freight or passenger-train express schedules, direct plant-to-door deliveries to all outlets are made by a fleet of seven company trucks. One of these is a shuttle truck operating between the 14 Washing-

Ten Minutes Later, the Processed Product is Taken Away

QUEEN of the fleet, a White tractor and Fruehauf trailer, carries 66 barrels of poultry in 1,400-mi. run made in 2½ days.

ton stores, while the other six are over-the-road route trucks.

Of the six route trucks, five are straight trucks and one is a tractor-trailer. The latter is the queen of the fleet, made up of a White tractor with a sleeper cab and a standard Fruehauf refrigerated trailer capable of carrying a load of 66 barrels, or 6,000 chickens.

It is employed on the longest of the six regular routes—that to Pittsburgh, Columbus, Cincinnati and Louisville, a round-trip distance of 1,400 miles. With two drivers, one sleeping while the other is driving, the trip is made in 2½ days. The interior trailer body temperature is maintained at 33 deg. F. level.

A Dodge 1½-ton truck with a closed panel body is used on the next longest run—the Buffalo, Erie and Cleveland triangle—a round trip distance of 950 miles. This run is made in 1½ days with 36 barrels, or 3,200 chickens.

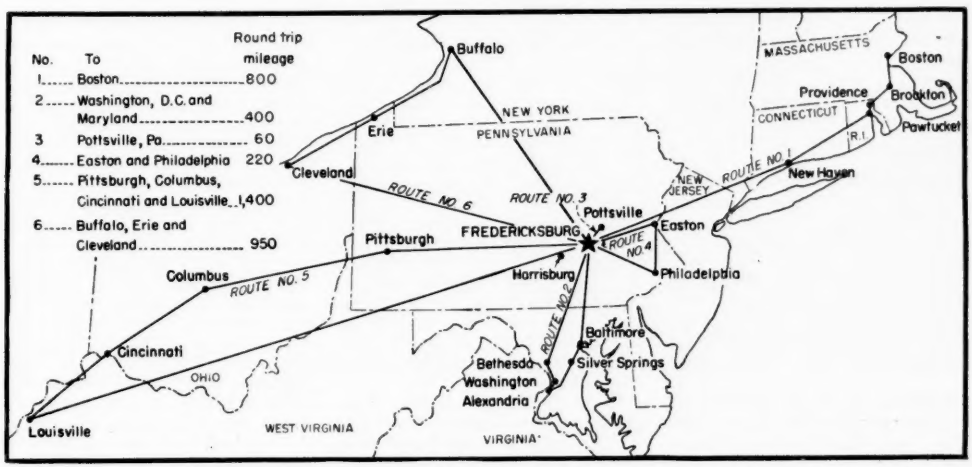
One Day Trip

Third longest is the run to Boston, with intermediate stops at New Haven, Providence, Pawtucket and Brockton—a round-trip distance of 800 miles. This trip is made in 1 day, a load of 42 barrels, or 3,800 chickens, being carried on a Model KB-7 International truck with a closed body.

The Washington, D. C., and Maryland run, 400 miles round trip, is made with a closed-body International Model KB-8 truck. This leaves at midnight with 50 barrels, or 4,800 chickens, and returns by noon.

The Easton-Philadelphia and the Pottsville runs are each made with Chevrolet 1½-ton trucks with open bodies. Here the distances are shorter and the flaked ice maintains the 33 deg. temperature up to time of delivery.

The former run is 220 miles and takes 7 hours with a load of 36 barrels, or 3,200 chickens. The latter, which is 60 miles and requires 3 hours, also delivers 36 barrels, or 3,200 chickens. The return loads on each trip consist of empty barrels, barrel cloths, and like materials.



SIX delivery routes are laid out to efficiently and quickly serve 40 company-owned retail outlets spread over a wide area.

REGISTRATION DESK is kept busy as hundreds "sign up" for a week of intensive education in new developments in food technology. They heard scores of talks and viewed numerous exhibits of equipment and supplies.

Highlights of IFT Convention

Part I

New discoveries, methods and ideas practical to food processors are discussed at San Francisco. Three achievement awards presented

FI STAFF

There was almost enough knowledge to fill an encyclopedia in the 110 papers presented and the 9 discussion groups at the Ninth Annual Convention of the Institute of Food Technologists held in the Civic Auditorium, San Francisco, July 9–15.

Three awards for outstanding achievement in the industry were conferred. And at the exposition held concurrently with convention, recent developments in equipment and supplies for the food processor were displayed in 100 booths located in the main arena.

Technologists from all parts of the United States and from Canada attended the meeting. Registration totaled approximately 2,000, including exhibitors.

Highlights of outstanding papers and discussions are presented here, with more to follow in Part II of this report in the September issue of FOOD INDUSTRIES.

Our Role in the World Food Picture, in National Production, in Peace and War. The part of the food technologist in the world food crisis is to produce 50 percent more food, said Dr. Mogens Jul, chief technologist, fisheries division, Food & Agriculture Organization of the United Nations.

The world population is increasing by 55,000 every day. To prevent the "standard remedies" for over-population—starvation, epidemics, and war—it is necessary that within the next decade the world increase food production by 25 percent.

To feed the world's starving peoples entails more than high production by the "have" nations. It means that the food must be shipped, delivered, bought, cooked, and eaten by the "have not" nations. It means the conquest of problems in sociology, economics, taboos, taste, and transportation.

Dr. Jul urged Americans to aid the poorer countries both by giving their technical "know-how" to countries that want to use it, and by showing them how to produce the foods America is willing to buy. This will call for investment in foreign countries—but improvement in the overall food picture will result.

Dr. Harry Wellman, director of the U. of California Giannini Foundation, said that price stabilization of farm crops will never work unless farmers submit to regimentation of everything—crop practices, fertilizers, seed, hours of labor, and the like.

No planned economy could give farmers a "fair share" of national income, said Dr. Wellman, for every other economic and industrial group would want a "fair share" and agreement as to "who gets what" would be impossible.

He stated that farm prices cannot be held steady in the face of booms and depressions, and he concluded that the "basic solution is a stabilization of demand for farm products."

Rohland Isker, Colonel U.S.A., retired, secretary, Associates, Food & Container Institute, observed that at the beginning of World War II there was very little cooperation between industry and the armed forces. In those early days, industry was asked mainly to supply an emergency ration of chocolate and a travel ration of dried beef and hardtack.

The Military, of course, does not produce; it merely writes specifications for industry to follow. The Munitions Board clears and coordinates. But national defense depends on the ability of industry to produce the required foods in quantity. In case of war, the actual requirements of industry have already been as-

signed. The machinery for the successful supplying of needs in peace or war is ready.

Insecticide Regulations and Hazards. Speakers in this session were in remarkable agreement— that there are so many chemicals in use as insecticides that, to safeguard the nation's food supply, all must be held to non-hazard levels. Their all-over effects must be studied. Pre-testing before use is imperative.

Dr. James R. Wilson, secretary, Council on Foods & Nutrition, American Medical Assn., Chicago, stressed the point that the Council is not opposed to rapid development of useful technological aids, but he said it is concerned with the safe use of chemical aids. He pointed out that many of the materials now used as insecticides will also poison warm-blooded animals. He warned that if the toxicity of any material to mammals is unknown, or incompletely known, a potential health hazard exists.

Of DDT, he observed that it is only remotely dangerous. However, cows that are fed fodder sprayed with DDT will retain part of the insecticide in their fat, also part reappears in the cream of their milk. Such milk could be toxic if used for the feeding of infants.

While urging the desirability of shortening the sometimes lengthy gap between laboratory tests and general use of pesticides, Dr. Wilson held that the complete effect of an insecticide should be known before it is used. There are cases where the use of incompletely tested materials have resulted in crop losses—cauliflower plants killed along with the insects, and potatoes ruined by too strong an application of BHC.

He offered assurance that the Council did not intend to handle these matters with hysteria. But danger, if any, must not remain hidden.

Tracing the history of tolerances for insecticides, Mr. McKay McKinnon, Jr., chief of the San Francisco District of F&DA, noted that it was not until 1915 that areas devoted to the growth of one crop became large enough to harbor certain idigenous pests and make spraying necessary. Soon, studies began to be made of poisonous residues that might be left on fruits and vegetables, with attention to their effect upon warm-blooded animals.

McKinnon pointed out that the Food, Drug & Cosmetic Act does not forbid the use of insecticides in the growing and storing of foods. But it does hold that a food is considered adulterated "if it bears or contains any poisonous or deleterious substance that 'may' render it injurious to health, regardless of amount." The potential danger of insecticidal residues should be of first concern to food processors. The public should not be used as a guinea pig.

Dr. W. M. Hoskins, Entomology Div., U. of California, observed that, with few exceptions, a recent survey showed the amounts of poisonous materials remaining on foods at harvest time after spraying with insecticides, were well below dangerous levels.

At the end of the 1920's, he said, the bug-man was looked upon as a harmless, and somewhat useless, person. Then DDT made large-scale operation possible in the South Pacific. Now, so many chemicals are used and so much DDT applied that fear has been generated as to the results of insecticide residues on public health.

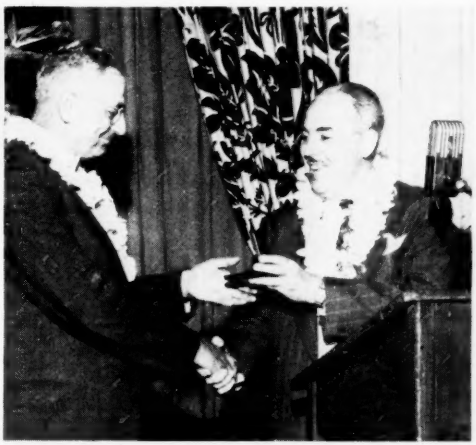
What amounts are present or can be tolerated in foods can be determined only by feeding tests. Hoskins pointed out that the trend is away from the stable inorganic compounds and toward relatively unstable organic compounds.

Costly Pilot Plants Pay Off. C. E. Morris, Refinery Div., Armour and Company, Chicago, reviewed his organization's experience with pilot plants to convert research laboratory results into production practice. He emphasized that pilot plant operations are expensive. Equipment is costly, maintenance costs are high, and operating expenses are excessive because of necessary, and almost continuous, changes which have to be made.

However, pilot plants permit adjustment of equipment design, process procedures and product composition to meet production and market needs on a small, or semi-plant, basis without interfering with regular plant operations or with production output. Also, the cost of manning a pilot plant is considerable. And unless a company is willing to make an initial large investment and follow through with the needed additional funds, a pilot plant program had better not be started.

Personnel requirements for a pilot plant program range from the Doctor of Philosophy level down to technicians of high school level, or lower, with varying degrees of experience in,

FOOD INDUSTRIES AWARD for outstanding achievement in food technology is presented to D. A. Hunt (right), president of Florida Citrus Canners Cooperative, by W. V. Cruess, member of Award Jury. Honor went to company for its frozen concentrated citrus juice process.



ROY C. NEWTON, vice-president and director of research, Swift & Co., receives Appert Award from Charles Smith, chairman of the Chicago section of the Institute of Food Technologists. The award is for distinction in the field of food technology.

and adaptability to, the particular field in which the company is doing business.

Although Armour and Company pilot plant programs have been costly in plant and personnel, they have more than paid their way after allowing for the initial period of operation "to get out the bugs," and they have been constant producers of revenue.

These plants cover: Refining of fats and oils, experimental baking, canning, meat curing and smoking, packaging, retention and enhancement of nutritive values, and processing of milk and poultry products.

Advanced Instrumentation. In today's food processing industries, advanced instrumentation is replacing rule-of-thumb methods and substituting science for the artisan, in the opinion of Lloyd E. Slater, Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

Electro-sensing units, such as thermocouples, resistance thermometers, pH electrodes and electric strain-gages, operate in conjunction with electronic amplifiers and indicators, recorders or controllers to provide highly accurate measurement and control.

Electronic instrumentation has advanced rapidly within the last 10 yrs., yet food processors have in the past been slow to adopt it because they are not familiar with that type of equipment. Advanced processing methods, however, call for it in many instances. These methods carry out control in the process itself, rather than in the laboratory.

CLARENCE BIRDSEYE (left) receives Stephen M. Babcock Award and a check for $1,000 from President "Dutch" Diehl. Provided by Nutrition Foundation, this presentation is for distinguished contributions to food technology that result in improved public health.

Thermocouples are widely used in heat-penetration and transfer studies. Resistance thermometers, which are not limited to a self-generated signal, as is the thermocouple, are employed in cooking preserves and high-temperature short-time pasteurization of milk. Their slowness of response has been overcome so that they are accurate to $\pm \frac{1}{2}$ deg. F. on continuous processes and to $\pm \frac{1}{8}$ deg. in batch operations.

Recent developments in electronic instrumentation include the thermopile, which measures heat radiation by sighting, and also the thermistor, which has a large change in resistance with respect to temperature change.

The thermopile may provide a way to measure temperatures in continuous high-frequency heating. It responds to temperatures as low as 75 deg. F.

The thermistor can be as small as a pinhead, therefore is usable in normally inaccessible places.

The glass pH electrodes have been applied in the control of sugar-mill liming operations, as well as in control of acidity in making jelly and in ripening cheese.

Conductivity cells, which use the controlled solution as an electrical conductor, will regulate the strength of lye-peeling baths and detect a lack of salt in a stream of tomato juice.

A direct pressure pick-up, of sanitary construction, has been made from an electric strain-gage. Rugged, sensitive and highly accurate, it has been tried with great success as a liquid-level gage in several food processes. Sixteen of these can be connected to one remote indicator.

Another new instrument is the electric hygrometer for measuring humidity or moisture. It consists of a styrene plastic tube with an electrical

(Turn to Page 90)

Fellers Elected President; Other Officers Named

Carl R. Fellers, professor of Food Technology, U. of Massachusetts, Amherst, Mass., was elected to the presidency of the Institute. Paul F. Sharp, director, California Agricultural Experiment Station, U. of California, Berkeley, was named vice-president.

Other new officers are: Secretary-Treasurer, Philip K. Bates, director, Rexall Drug Co., Los Angeles. Executive Secretary, Charles S. Lawrence, president, The Quartermaster Board, U. S. Army, Camp Lee, Va. He takes office in Chicago on Oct. 1.

Councilors-at-Large: A. K. Balls, Enzyme Research Laboratory, Albany, Calif.; F. W. Fabian, Michigan State College, East Lansing; J. Avery Dunn, Atlantic Gelatin Div., General Foods Corp., Woburn, Mass.; H. D. Lightbody, Q. M. Food & Container Institute for Armed Forces, Chicago; H. W. Vahlteich, The Best Foods, Inc., Bayonne, N. J.

1950 IFT Meeting Program Chairman, Lloyd A. Hall, Griffith Laboratories, Inc., Chicago. Publicity Committee Chairman, M. E. Parker, Illinois Institute of Technology, Chicago. Employment Committee Chairman, Keith A. Fitch, W. J. O'Connell & Associates, San Francisco. Membership Committee, R. V. Wilson, Continental Can Co., Chicago.

Two Regional Charters Granted

IFT Regional Section charters were granted to the Ohio Valley and Oregon groups. Norbert H. Volle, The Kroger Co., Cincinnati, is Ohio chairman, and Ernest H. Wiegand, Oregon State College, Corvallis, is Oregon chairman.

Name of the Iowa Section was changed to Ames Section.

Full-Time Secretary Hired

Col. Charles S. Lawrence has been employed by IFT as Executive Secretary and he also will serve as Business Manager of "Food Technology." His office will be at 222 W. Adams St., Chicago, after Oct. 1. Philip K. Bates, appointed Secretary-Treasurer for one year, will function primarily as Treasurer.

Additional IFT News

The invitation of the Great Lakes Section to hold the 1952 Annual Meeting at Mackinac Island, Mich., was accepted.

IFT membership has increased to 2,905, as of July 1, and the paid registration (IFT members) at the 1949 Annual Meeting was approximately 900.

Affiliation of the Institute with the American Association for the Advancement of Science was announced. An IFT Employment Committee, consisting of a chairman and a representative from each regional section, was established. Compilation of a "Who's Who in Food Technology" was authorized, and approval was given to a questionnaire drafted by the Committee of Liaison With the Armed Forces to obtain necessary information.

We Think . . .

▪Industry People Help To Mess Up Standards Hearing

Two months ago, we criticized the bread standards hearings in these columns. We expressed the feeling that F&DA executives must do something to restore the system of standards making to an orderly status.

We still feel that way. But some of our friends in industry believe that we placed all the responsibility in one place, improperly. There was no intent to do this, because we have always recognized that industry has its responsibility. And we feel, as do these critic-friends, that some divisions of the food business have not accepted their rightful share of the responsibility in these bread standards proceedings.

There is a great temptation for the zealous spokesman of a food firm to use even an official proceeding for promoting his individual company's cause. In the bread hearings, it is obvious that some of the attorneys have yielded to this temptation to a wholly unwarranted degree. It would even appear that advocates of certain goods were trying to advertise them through highly partisan witnesses. This has been done under the guise of making a record of fact and of significant professional opinion. The presiding officer has been unable to curb this adequately.

So long as the hearing contributes facts pertinent to questions at issue, it would be highly improper to restrict testimony or constructive cross-examination. But attempting to interfere with new processes, under the guise that any change is wrong, cannot rightly be considered a proper part of a standards procedure.

Companies whose zealous advocates have gone so far in the recent hearings will do well to reconsider company policy. Some of these spokesmen appear to have discredited their own position and destroyed their future influence among technical and perhaps official people. Such a result would be costly to individuals and to companies beyond any possible immediate gain.

Again we urge that F&DA executives find some tolerable and reasonable method of shortening the hearings and restraining excessive zeal. And we urge with equal fervor that company spokesmen, especially zealous attorneys, accept their share of the responsibility in this matter.

▪Go Slow in Curtailing Research—It Insures Your Future

It is disquieting to hear tales of heavy slashes in research appropriations. We refer to reductions so severe that there is no possible way of operating within the departmental budget other than by dropping a number of research workers. One wonders if management is not taking an extremely short-range view when it dumps good men merely for the sake of the next earnings statement or dividend.

Naturally, corporate management must be realistic. But "realism" is a weasel word, capable of many interpretations and shades of meaning. Research should be carried on to insure future dividends—not merely the next ones, but those far on into the future. To abandon it means to trust to luck.

But research has another function—the training of future technical executives in the fundamentals of the business. Sometimes, men who are not the best at research will become valuable in operating, executive or sales positions after they have graduated from the laboratory.

About 1940 we heard a remark which made a lasting impression. It came from a food company executive. He said:

"In the depression of the 'Thirties we dropped a lot of research men, thinking we were very wise. Only this year (1940) did we realize what we had done. We are now forced to promote nontechnical people into technical executive jobs—because we have nobody else available.

"Sure! We could go out and hire technically trained men. But they would have no experience in the operation of our company. Next time, we'll borrow money before we dump our research people!"

The ardent advocate of "realism" should be certain that he knows what he is doing when he orders wholesale curtailment of research programs. Not only does he sacrifice personnel and progress, but he makes available to competitors the technical men whom he has trained in the business, at considerable expense. And the competition also gets a host of the former employer's good ideas.

Careful, long-range consideration of the effect of economies in research is highly advisable. Instead of big reductions in research and development budgets, it is possible that a whole new set of projects is in order.

When a research project is costing more than it should in relation to the probable value of the end result, that is the time to stop the work. But even when that time comes, the remedy is not to curtail research as a whole, but to tackle something else.

▪Secretary Sawyer Right—Government Can't Solve Your Problems

There is at least one high government official who has a sane perspective in respect to government control of business trends. We refer to Secretary of Commerce Charles Sawyer, himself a highly successful and widely experienced business man.

Speaking before the recent Atlantic City convention of National Restaurant Association, Mr. Sawyer made a point which may well impair his popularity in Washington circles. He emphasized that it is not possible for any government or government official to direct so closely and wisely the changes in our economic situation as to avoid completely serious situations and difficult problems.

"This," he said, "should be clearly understood by you businessmen and by government officials alike. You should not look for miracles from your public officials, nor should they labor under the delusion that they are miracle men."

We think most businessmen understand these facts of

commercial life. But under certain circumstances, there is a tendency to forget them. When a business or an industry is in a tight spot financially or economically, there is a temptation to rush to Washington for help in the way of a loan or new laws or regulations which favor the faltering business or industry. This not only opens the door to government control, but it convinces Washington that the business or the industry can't solve its own problems. Ergo, government control is needed and justified.

So business should solve its own problems—or at least do an outstanding job of trying. And more than that, businessmen ought to become students of economic trends and pitfalls. Then they should do what they can within their own province to avoid conditions contributing to unsound or dangerous business and economic trends.

■ Newcomers Should Be Given an Opportunity to Find Faults

Another crop of graduates in food technology has joined the food processing industry. They are to be congratulated on their wisdom in selecting for their career the most basic, biggest and most stable industry of them all. But the food processors who hired them are fortunate, too. They have invested a little in salaries which should enable them to reap a lot through improved processes and products.

Now a word to the bosses of these newcomers. As the instruction booklet says about your new car, you have a fine product. But to get the most out of it you must break it in carefully. The metal parts must "become acquainted" with each other and develop an affinity for oil.

So with the new technologist in the industry. He is made of good stuff, but he needs careful handling for the break-in period. And he must become acquainted with the various parts of the business and develop an affinity for the technological problems and policies of the company.

Before being assigned 100 percent to specific jobs, the newcomer should be shown around the place and given enough free time that he can become thoroughly familiar with all the operations. And someone ought to tell him about all the technical problems that need to be solved.

During this get-acquainted period, the newcomer should be encouraged to ask questions about things which don't seem to "add up" in his mind. About 99 of 100 such questions will bring a ready answer. But the 100th may put the finger on something which ought to be changed. And you would have thought of it yourself, only you have been around so long that you take it for granted, like the roof over the place.

Don't ever hire a technical man and lock him up in the laboratory with the test tubes. The lab is merely the workbench to which the technologist carries your problems. It's analogous to the machine shop to which the master mechanic takes a faulty part. But the mechanic doesn't find the faulty part in the shop, he finds it in the factory. No, your technical man won't spot haywire processing in the lab, but may see it if he studies actual operations.

So make your new technical boy very much a part of your whole operation. Don't fence him in!

■ Multiple-Product Dairy Plants Are Highly Desirable

"Intraplant flexibility" is an important objective to facilitate economic operation and low costs in dairy products manufacturing. This is an important and significant conclusion of a recent circular of the Bureau of Dairy Industry. Strongly urged are multiple-product plants which permit allocation of milk regularly received to one or another end-product according to quantity available and market conditions for all possible products.

Thus the Department of Agriculture urges what food technologists have long wanted—the establishment of conditions which permit processing for fluid milk and cream, for ice cream, for cheese, or for manufacture of butter, without compelling the farmer individually to judge where his milk must go.

Fully diversified plants are, of course, of maximum advantage in this regard. They make available the best food technology and skilled management. They are now possible in many areas because of improved home care of milk and successful long-haul before processing through proper tank truck handling. The benefit goes both to farmer and to processor without any new economic burdens on the ultimate consumer.

■ Preservation of Raw Material to Extend Season Merits Study

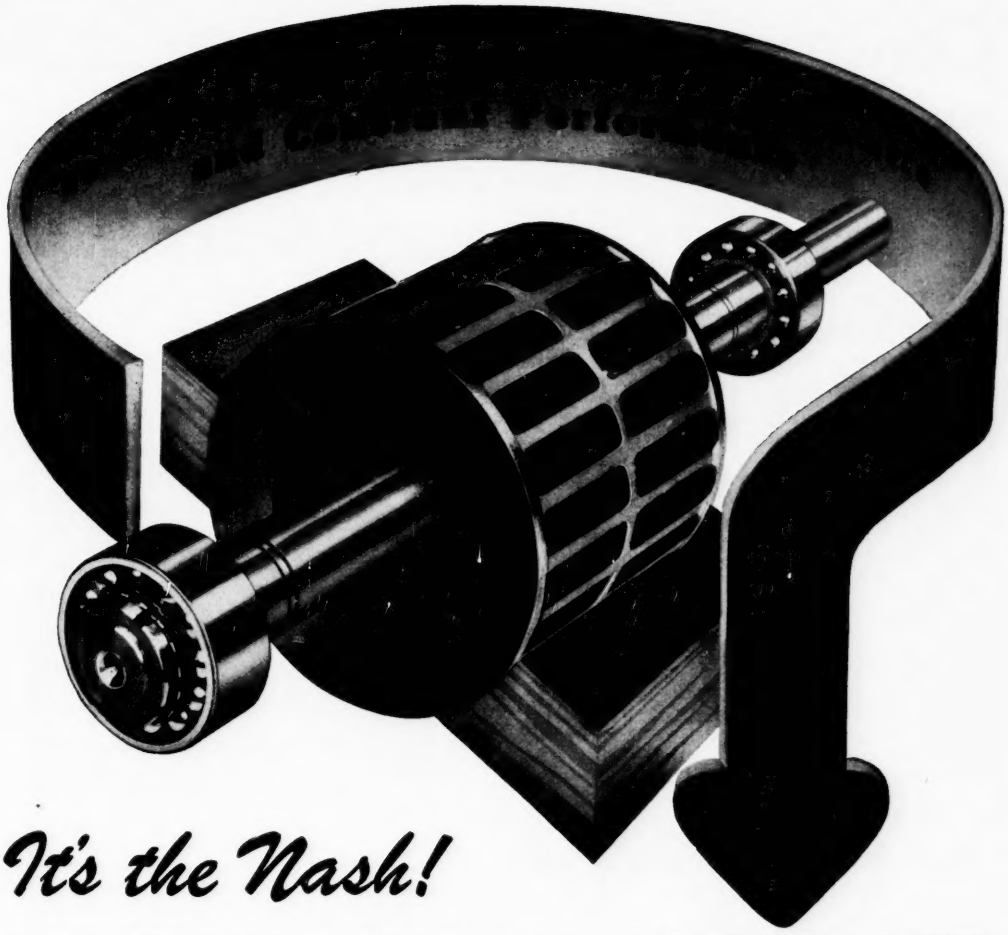
Many food processers must take their raw material seasonally and work it up quickly if they are to make a quality processed food. There is nothing more perishable than the flavor of green peas or sweet corn, for example. But there are certain other seasonal operations which might be stretched into longer periods of processing. They certainly deserve critical analysis from time to time in the hope that such a result may be obtained.

Recently, we reviewed a report on the beet sugar industry which was suggestive along these lines. It pointed out the possibilities, despite admitted limitations, of preliminary processing of beet supplies into the form of dried cossettes. The plan suggested was the slicing and drying of the beets at strategic points in the producing areas, with shipment either before or after storage in a way that would permit a much longer season of beet sugar recovery than now is feasible. The huge investment in a beet sugar plant might thus be made usable for many more months than now is practicable, when only the fresh beets are being processed.

We believe that there is a substantial number of food processing establishments which might profitably review, from this point of view, their technic in handling of seasonal raw material. The problem is essentially one of preserving this material in a form which will permit long-season running of expensive factories without decrease in palatability or dietetic value of the finished product.

By this means the capital cost might be reduced to such a point that quality goods could be sold much more successfully in competition with other foods. And there is no doubt that this type of competition is going to grow rapidly in the next few years as food surpluses overhang the market.

We hold no brief for dried beet cossettes. Appraisal of that possibility is a job for the beet sugar industry. But we do insist that the plan of extending seasonal operations is a job too often neglected by many food processors.



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Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

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No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature Automatically maintained.

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NASH ENGINEERING COMPANY

31 WILSON, SO. NORWALK, CONN.

Convention Reports

Pickle Packers Discuss Sales

Short mid-year gathering also hears promise that salters will soon be told how to protect stocks

Aggressive selling was the keynote of the mid-year meeting of the National Pickle Packers Association, held at the Bismarck Hotel, Chicago, June 24.

More than 100 pickle packers from various parts of the country heard President Harry Conley, Green Bay Food Co., Green Bay, Wis., stress the selling of more good quality products. He cautioned against a state of gloom, saying that there are no shortages, that the industry is well off, and that a buyers' market is normal. Advocating a middle course between optimism and pessimism, he urged members to prepare for larger pickle sales.

National Pickle Week was discussed and declared a success as evidenced by increased sales since then. Continuation of the Week, as an annual event, was urged.

Leon Glaser, Glaser, Crandell Co., Chicago, association vice-president, presented statistics showing that sales of pickles during April and May broke all previous records. More than 1,000,000 bu. a month were consumed. He also reported statistics on contracted acreage and inventory of salt and dill stock on hand as of June 1. Projected total for the country is 5,490,851 acres.

Nelson Morgan, chairman of the research committee reported that research is continuing at North Carolina State College and Michigan State College, but that no report would be given until the annual meeting in the fall.

F. W. Fabian, Michigan State College, East Lansing, Mich., urged putting the pickle industry on a scientific basis and advocated discontinuing the use of wood for everything except tanks. He hinted that science will soon be able to predict accurately whether or not salters' tanks of pickles will spoil. Fabian, who has devoted more than 18 years to pickle research, stated that research studies now in progress will, for the first time in history, give salters information on how to protect their brine stocks. Tests will indicate what the bacteria in each tank are doing.

Highlights of IFT Convention (Cont'd)

winding which is coated with a hygroscopic film. The moisture content of the film affects the resistance of the winding, giving rapid response, very high sensitivity, and high accuracy. The device has even been used to measure the occluded moisture in grains and cereals.

A new "densitrol" continuously measures density, or viscosity, of food products with extreme accuracy. It consists of a plummet which rises or falls in a chamber as density varies. An induction coil around the chamber functions as a pick-up.

Trends in Baking Industry. Significant developments in the baking industry were outlined by William H. Cathcart, director of laboratories, Great Atlantic & Pacific Tea Co., National Bakery Div. Some bakeries are experimenting with the bulk handling of flour to reduce costs. Airveyors, Fitch cars and bulk containers, together with Tote Bins, are being tried. One disadvantage cited for the bulk container is that it must be cleaned.

The use of prepared cake and doughnut mixes has increased tremendously in the bakery industry. Another trend is augmented use of dried yeast, which keeps without refrigeration and remains active longer than cake yeast. It also is less bulky, ¼ lb. being equivalent to 1 lb. of cake yeast.

Several bakers have had good experience with the silicone coating of pans to eliminate greasing. Others have had difficulties. But the problems are being solved, and in the future probably all bakers will find silicone-coated pans workable. Pans also are being coated with an aluminum-resinous paint. These pans need not be "burned out."

The Oakes continuous mixer, already proved satisfactory in making marshmallow, icings and sponge cake, shows promise for other products. Emulsifiers are being adopted to decrease the firming rate of bread, as well as the rate of staling. Antioxidants have increased the shelf-life of crackers.

A more uniform grain texture in dough is attained by a machine which sheets and rolls at right angles. An automatic recorder is employed as a "watchdog" for mixers to show that all ingredients have been put into the batch.

In packaging, the trend is to greater visibility and more rigid cartons which protect the product. To reduce labor, pies and cakes are being baked in the tins and cartons in which they are sold to the consumer.

Frozen bakery products have made some headway. With yeast-raised rolls and pies, best results are obtained by freezing the dough before fermenting. Then the dough is thawed, permitted to ferment, and baked immediately. In freezing cakes, the best practice is to bake them, wrap in paper which has high moisture-vapor resistance, and then freeze. Cakes should be defrosted before unwrapping.

Mr. Cathcart also mentioned the use of dielectric heat for defrosting frozen fruit and for killing mold spores on bread after it is wrapped.

Shortenings Being Improved. H. S. Mitchell, Director of Laboratories, Swift & Co., Chicago, stated that although all edible fats and oils are good ingredients for shortenings—and that their origin, whether animal or vegetable, is of no consequence—none of the natural fats or oils have all the qualities needed for all uses of shortenings. Even after they are processed, none make an all-purpose shortening, particularly for bakery products.

The ability of a finished shortening to meet users' requirements depends to a considerable extent upon the technological skill and guidance and the research and production facilities of the manufacturer. These skills and facilities are utilized in: (1) Raw material selection and handling, (2) Rendering methods and means, (3) Refining processes, (4) Chilling, and (5) Packaging.

Research contributions are steadily being utilized to improve specific properties and performance characteristics. This gives them broader properties as well as improved specific properties, compared with those possessed by natural fats and oils.

Resumes of other papers and additional photos will appear in the concluding Part II, September FOOD INDUSTRIES.—*The Editors.*

BY INDUSTRY-WIDE REQUEST

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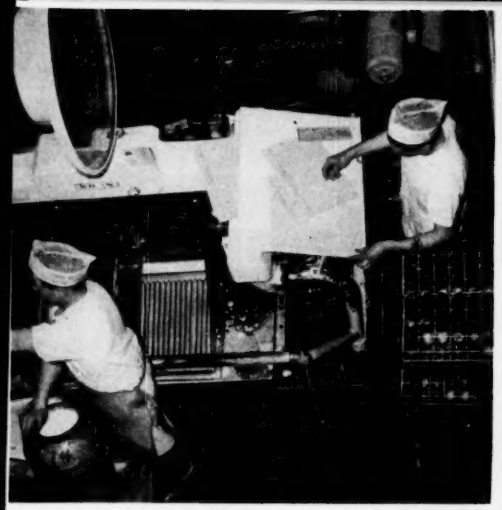
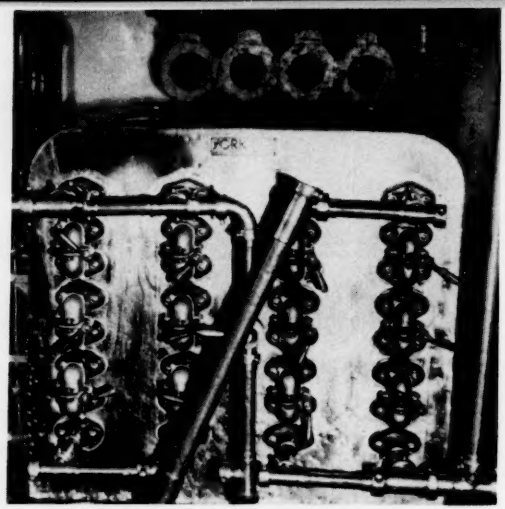


1 **RAW MILK,** received in 10 gal. cans, is emptied and weighed and sampled for butterfat content.



2 **DOUBLE-TUBE COOLER** unit employs liquid ammonia as refrigerant to cool milk on way to storage.

Fluid Milk and Byproducts Operation

Modern Layout Balances Output, Gives Highest Per-Gallon Return

(Article on Page 67)

A TWO-FOLD AIM was fulfilled when Lehigh Valley Dairy built its new plant in Allentown, Pa. Its modern processing line turns out a variety of products—to balance production seasonally, and thus obtain a maximum return from every gallon of milk received.

The accompanying photo-diagram presentation tells the story. Milk is received in 10 gal. cans, and that which passes inspection is dumped into scale tanks and weighed—as depicted at Point 1 in the flow sheet—immediately cooled to 34 deg. F., then stored in 5,000-gal. direct-expansion ammonia-refrigerated tanks.

Bottled Pasteurized Milk. Cold milk is brought to irradiators, where it is subjected to ultra-violet rays for vitamin D enrichment, then pumped to centrifugal clarifiers for removal of sediment and blood cells.

Clarifiers feed the flash pasteurizer, operation of which is instrument controlled. The hot milk is then homogenized at 2,500 psi. to disperse fat globules.

Leaving the homogenizers, the milk returns to the cooling section of the pasteurizer, where it is cooled to 38 F. by refrigerated brine. It is then pumped to agitator-equipped surge tanks. These feed the bottle-filling sections of machines, which form, wax-dip, fill, close and date each bottle—see Points 6, 7, and 8 in the flowsheet.

Cream. Milk from the raw-storage tanks passes through a heat exchanger before entering the cream separators, which are set for one of the three grades processed—light, whipping, or 50 percent butterfat cream. The latter is for freezing. Cream is cooled over a surface cooler; skim milk by regeneration against raw milk from storage.

Condensed Skim. Skim milk to be condensed is heated enroute to the vacuum pan, shown at Point 11 in flowsheet. Here, it is condensed 3½ to 1 (to 30 percent solids), then cooled and run into 10 gal. cans for storage, or pumped to holding tanks.

Dry Milk. Skim is heated as for condensing, then pumped to a steam-heated double-drum dryer, which reduces the water content to less than 1 percent.

Ice Cream Mix. Milk and condensed skim, or milk and dry milk, are mixed with cream, heated in a holding pasteurizer, homogenized, and cooled in a plate-type heat exchanger. Cooled mix is transferred to refrigerated, instrument-controlled storage tanks, where flavoring and other ingredients are added. The finished product is either packaged for mix sales or made into ice cream.

Dry Feed. Past-date products are collected from stores and returned to the plant. After cream is separated from them, the remainder is drum-dried, making a feed.

Refrigeration. Cooling is performed in five ways: (1) Raw milk by liquid NH_3; (2) storage rooms, ice cream freezers, milk storage tanks, by direct expansion; (3) pasteurized milk by $CaCl_2$ brine; (4) ice cream mix by sweet water; (5) cold wall tanks by propylene glycol.

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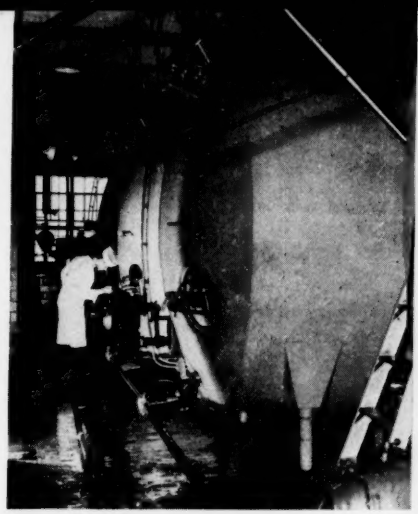
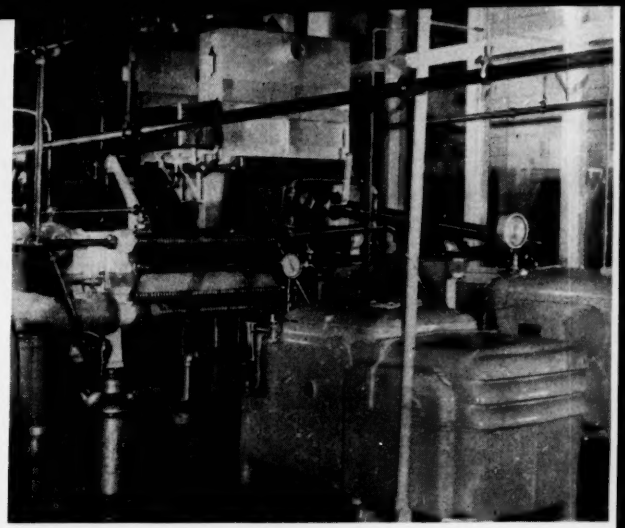
ADVANCED FOOD PLANT ENGINEERING

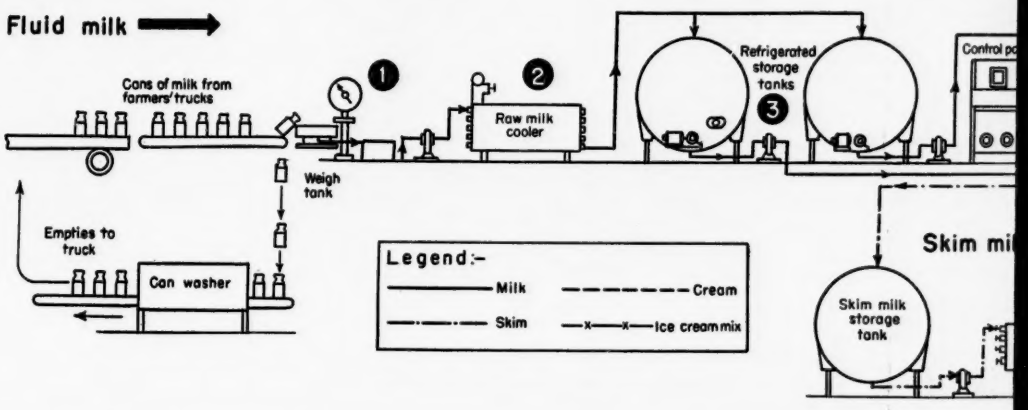
FI Picture-Flowsheet 8



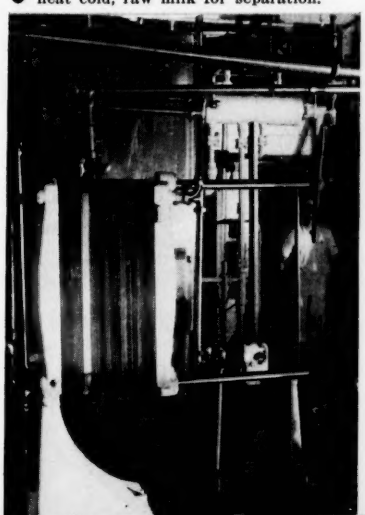
3 **STORAGE TANKS** for raw milk are stainless steel. They have agitators, are NH_3 refrigerated.



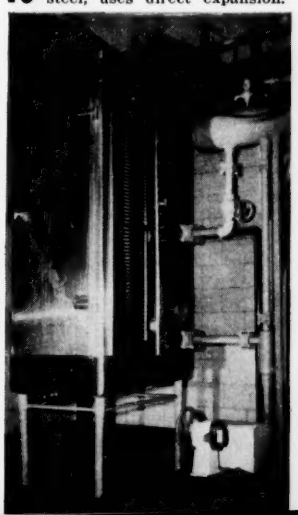
4, 5 **IRRADIATORS** (upper left) enrich raw milk with vitamin D before pasteurizing in plate unit (left) and homogenizing (right).



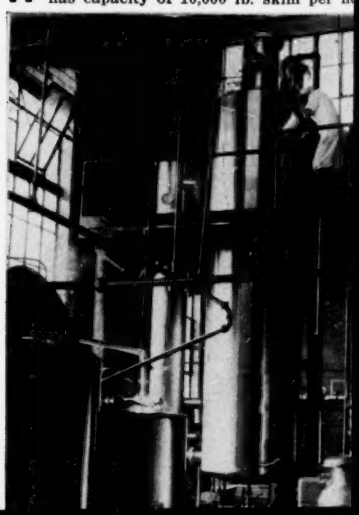
9 **PLATE-UNIT** employs regeneration to heat cold, raw milk for separation.

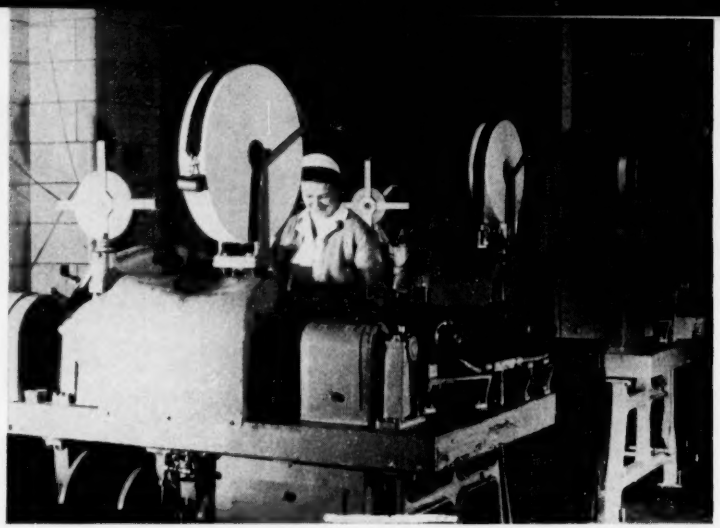


10 **CREAM COOLER,** of stainless steel, uses direct expansion.



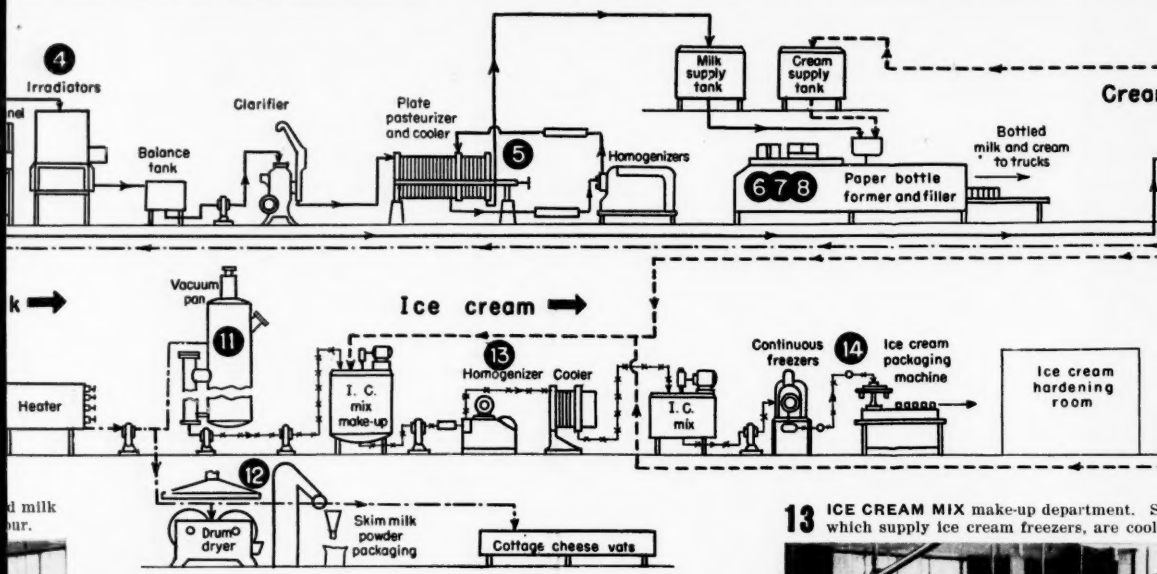
11 **VACUUM PAN** for producing condense has capacity of 10,000 lb. skim per h





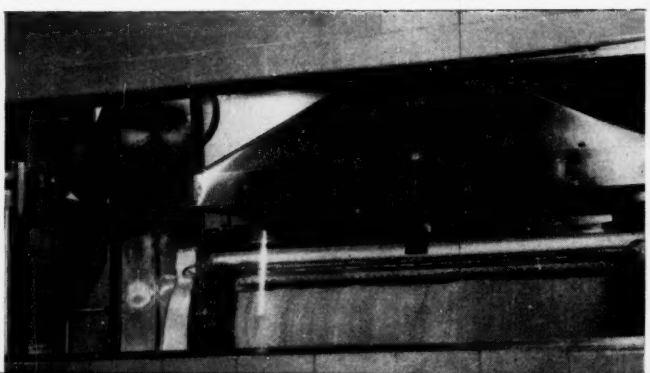
6 **FORMING MACHINES** produce non-returnable bottles from reels of special paper. Finished bottles are packed into skid boxes for transportation to dipping machines.

7 **WAX-DIPPING MACHINES** coat formed bot paraffin pumped from steam-heated storage

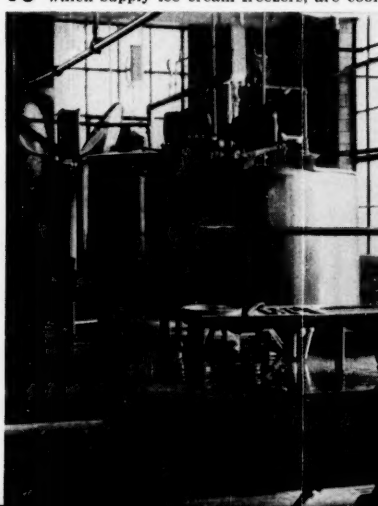


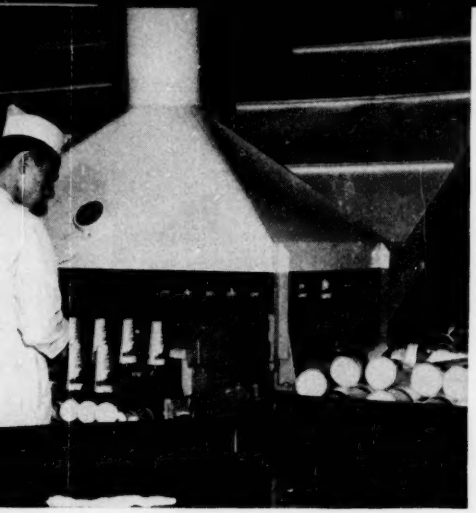
d milk
our.

12 **DOUBLE-DRUM DRYERS** produce edible dry milk from surplus skim, also make cattle feed from past-date route returns.



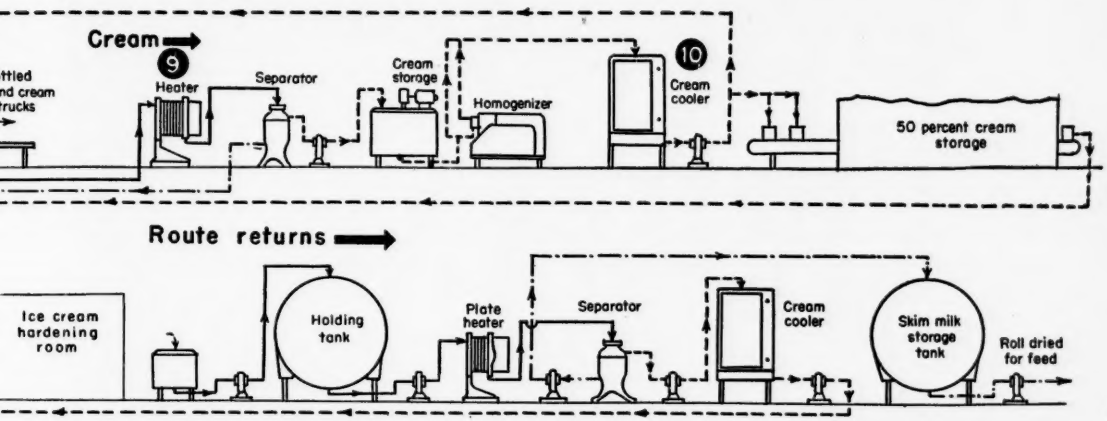
13 **ICE CREAM MIX** make-up department. S which supply ice cream freezers, are cool



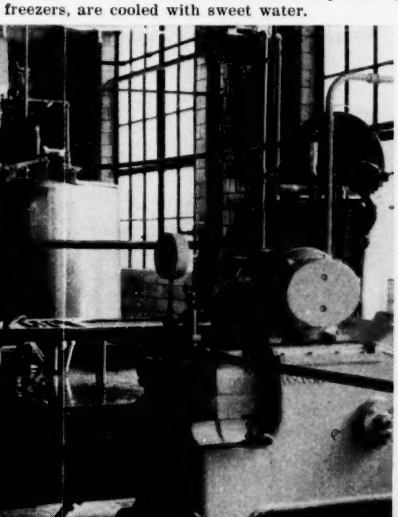


S coat formed bottles by immersing them in hot, melted m-heated storage tanks.

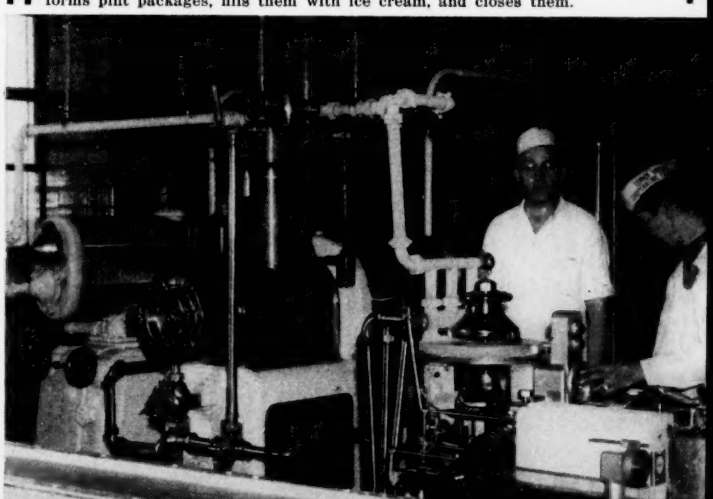
8 FILLING. Coated bottles are filled with milk, then closed and dated with last day on which they are to be sold, and conveyed to storage.



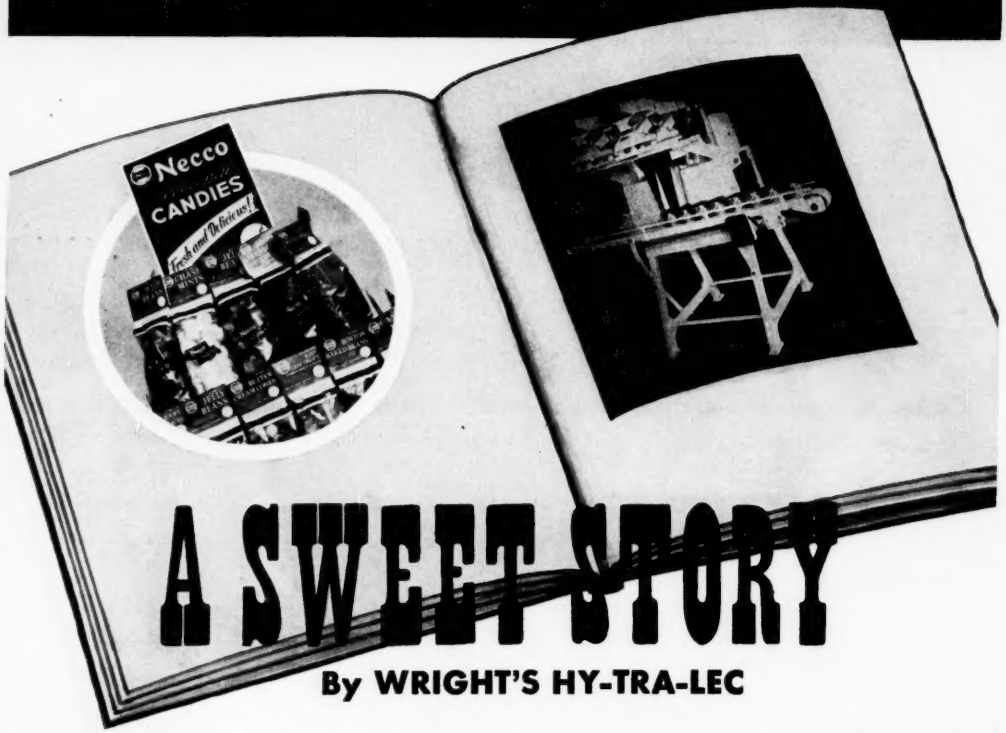
up department. Stainless steel tanks on platform, freezers, are cooled with sweet water.



14 FREEZER ROOM. Continuous freezers (left) feed automatic machine that forms pint packages, fills them with ice cream, and closes them.



"Weighs & Fills Dry Products More Accurately At High Speeds"



A SWEET STORY

By WRIGHT'S HY-TRA-LEC

Candy Industry leaders* offer a clue to you who are seeking lower production costs. They dared to explore a new weighing and filling machine . . . a machine which utilized entirely different principles. Candy was an untried application but by mutual cooperation the desired money-saving results were secured. Today, Wright's Hy-Tra-Lec is writing a "sweet story" of reduced production costs in a growing number of candy plants.

*Such as Kroger's, Frantz Marshmallows, New England Confectionery, Charms

The story may be just as "sweet" with your particular product if it is dry and fairly free-flowing. Range: one-half ounce to 16 ounces. Semi-automatic for bags or fully automatic models for rigid containers with one, two, three, or four weighing heads.

Send us an ample quantity of your products for testing purposes. Include all the information you think would help us help you. Or, if you merely want to get descriptive literature as a starter, that's all right too. But do it now while there's still time for you to get the jump on competition. Meantime, congratulations for being alert to the possibilities of modern advances!

WRIGHT MACHINERY COMPANY

ESTABLISHED 1893 · DURHAM, NORTH CAROLINA
SUBSIDIARY OF THE SPERRY CORPORATION
Offices In New York, Chicago, San Francisco, and Durham

For process piping in ion exchange ...CRANE has everything you need

In ion exchange—whether for water treating systems, as shown here, or for any other process—Crane can supply all piping equipment for your installation. Check your needs against the Crane Catalog. You'll find it offers an unequalled selection of valves, fittings, pipe and accessories—in brass, iron, steel, and alloys—available on one order to your local Crane Branch and Wholesaler.

Why not learn the advantages of standardizing on Crane? It's a **Single Source of Supply** complete enough to simplify every piping procedure, from design to erection to maintenance. **One Responsibility** for materials helps to assure the best installations, avoids needless delays. **High Quality** in every item from the broad Crane line certifies uniform dependability throughout process piping systems.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

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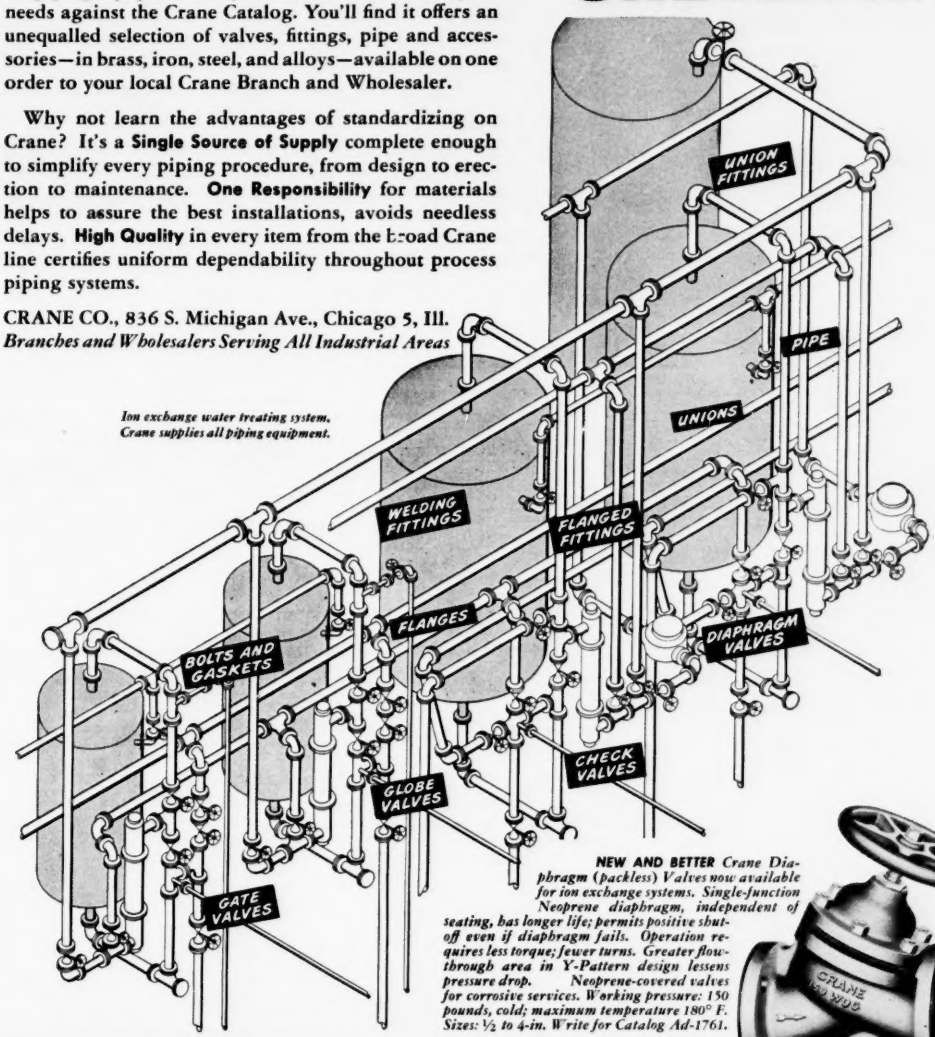
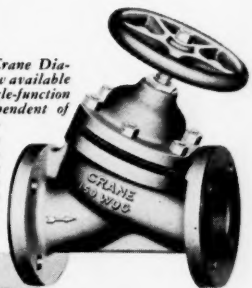
RESPONSIBILITY
STANDARD OF QUALITY



Ion exchange water treating system. Crane supplies all piping equipment.



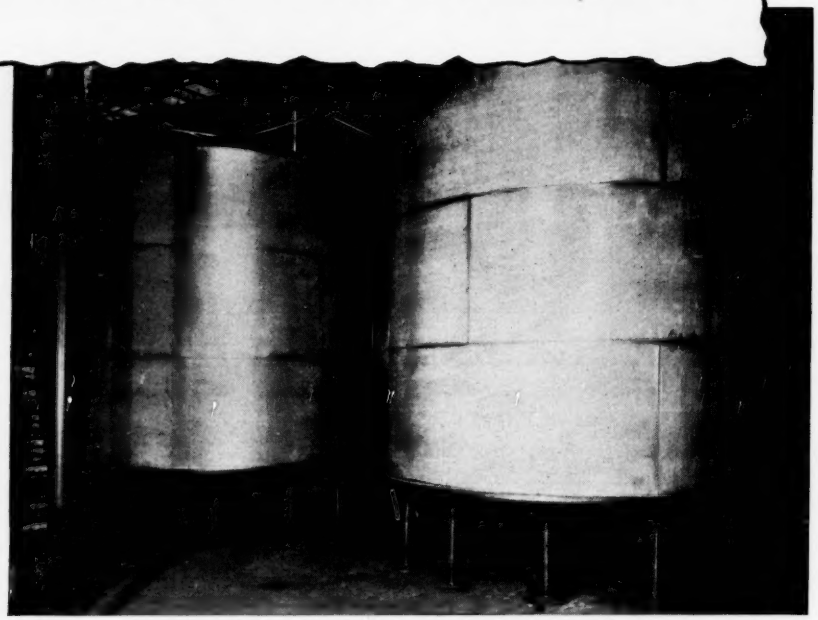
NEW AND BETTER *Crane Diaphragm (packless) Valves now available for ion exchange systems. Single-function Neoprene diaphragm, independent of seating, has longer life; permits positive shut-off even if diaphragm fails. Operation requires less torque; fewer turns. Greater flow-through area in Y-Pattern design lessens pressure drop. Neoprene-covered valves for corrosive services. Working pressure: 150 pounds, cold; maximum temperature 180° F. Sizes: ½ to 4-in. Write for Catalog Ad-1761.*

EVERYTHING FROM . . .
VALVES • FITTINGS
PIPE • PLUMBING
AND HEATING

CRANE

FOR EVERY PIPING SYSTEM

12-FOOT Stainless-Clad Steel HEADS FORM THE BOTTOMS OF THESE BOTTLING TANKS



A. M. Harris, Inc., of Cincinnati, Ohio, built four of these whiskey bottling tanks for The Geo. T. Stagg Company of Frankfort, Ky.

$\frac{7}{16}$-inch Stainless-Clad Steel was used by Lukens to spin the 12-foot flanged and dished heads that form the bottoms of four whiskey bottling tanks; cladding is 20% of total plate thickness. Side walls of the tanks are $\frac{1}{8}$-inch solid stainless. Thus the whiskey is safeguarded against metallic contamination.

These clad steel bottoms, in combination with the solid stainless sides, provide a stainless steel interior surface and give the tanks high structural strength where needed. That's why it pays to use Lukens Clad Steels—Nickel-Clad, Stainless-Clad, Inconel-Clad or Monel-Clad. Users get the advantages they'd gain with *thick sections* of the corrosion-resistant metal, but at the lower cost of clad steel.

In Lukens Clad Steels, a uniform cladding—10% or 20% of total plate thickness—is permanently bonded to its steel backing plate. Lukens makes plate to over 3 inches thick or as wide as 178 inches. The extra-smooth sodium hydride finish makes equipment extra easy to keep clean.

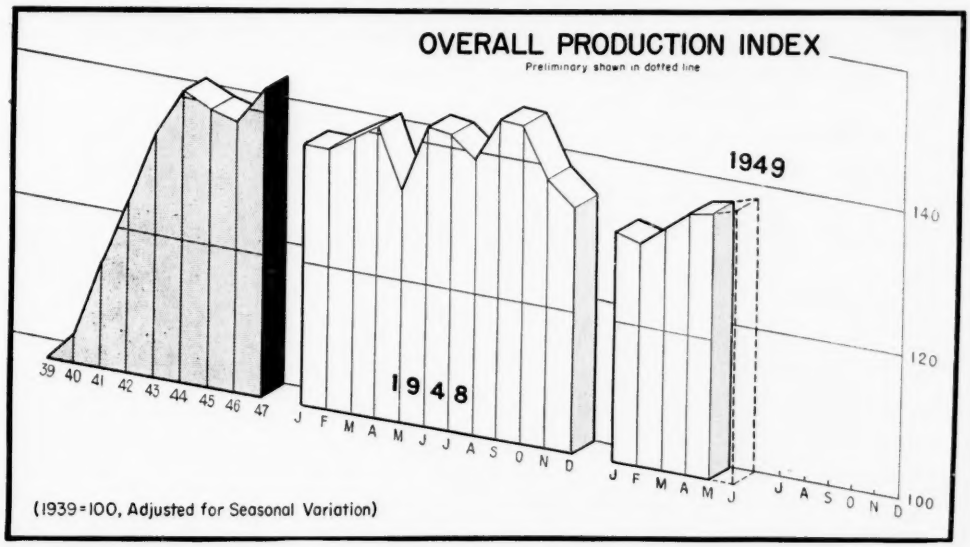
Ask your suppliers to quote on equipment providing these advantages. Bulletins 255 and 338 tell you more about Lukens Clad Steels. For copies, write Lukens Steel Company, 401 Lukens Building, Coatesville, Pa.

LUKENS

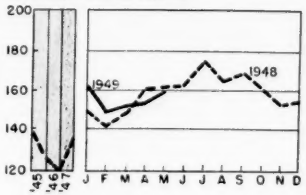
Nickel-Clad Stainless-Clad
Inconel-Clad Monel-Clad
STEELS

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY

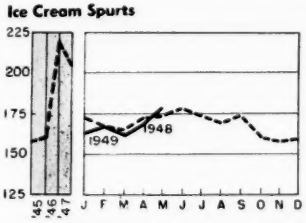
Food Industries Index


OVERALL PRODUCTION INDEX
Preliminary shown in dotted line
1949
1948
39 40 41 42 43 44 45 46 47
J F M A M J J A S O N D
J F M A M J
J A S O N D
140
120
100
(1939=100, Adjusted for Seasonal Variation)

Beverages Climb Again



Ice Cream Spurts



Output Only a Shade Under Year Ago; FI and FRB Figures Are Compared

Substantial increases in processed food output, between April and June, are indicated in our preliminary June index of 138 and the revised figure of 137 for May. April's mark was 134. Last year's June index was 142.

CURRENTLY, the big question is: What will happen in canning and freezing? Activity increased 4 percent from April to May—a better than seasonal increase, but still below last May's showing. The industry has been operating at a rate 7 percent behind its average in the first five months of last year. Recovery from last fall's slump has been slow. One big question is price. Consumers are being more and more choosy about their purchases. So wholesalers are buying with caution.

Meanwhile, attention is drawn to what may appear to be a serious discrepancy between the FI index and the Federal Reserve Board's index of Manufactured Food Products.

This year has seen the two indexes vary markedly. In the first four months of 1949, the Federal Reserve Index shows the food industry producing more than it did in the same months of last year. FI's index indicates that production is down. There are also marked differences in the performance of the two by months.

The first, and most important, reason is that the two indexes do not measure the same thing. Each item carries a different "weight"—or makes up a different percentage of the whole—in each index. Table on next page indicates the variations.

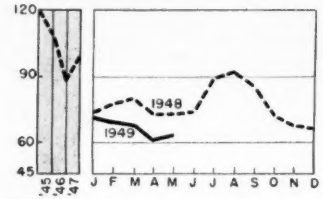
Explanation is found in the dates at the head of the table. FRB's index "weights" the importance of the industries by their relative importance in the years 1935-39. But as processing technics improve, and as consumer tastes change, the importance of the several branches changes. FI solved this problem by constructing its index from employment figures, adjusted for the average number of hours worked per week, and adjusted for changes in output per man-hour. This puts activity in each different industry on a comparable base. Another advantage is that when one industry expands faster than another, it is immediately reflected in the index. Distortions brought about by using fixed 'weights' do not appear.

At a Glance—

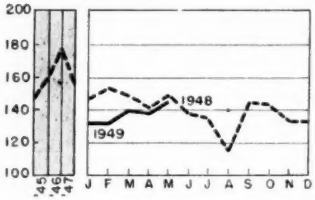
(1939 = 100. All Figures Adjusted for Seasonal Variations)

	May 1949	Apr. 1949	Percent Change	Year Ago
Baking	140	137	+2	140
Beverages	159	152	+5	161
Butter	73	78	−6	67
Canning	145	139	+4	149
Cereals	142	137	+4	146
Condensed Milk	173	171	+1	167
Confectionery	100	107	−7	105
Flour	124	122	+2	131
Ice Cream	178	169	+5	177
Malt Liquors	155	147	+5	161
Margarine	267	283	−6	352
Meat Packing	145	139	+4	108
Sugar, Beet	62	62	...	97
Sugar, Cane	63	61	+3	74

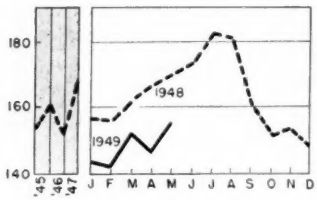
Cane Sugar Lifts



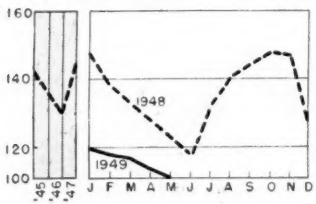
Canning In Upturn



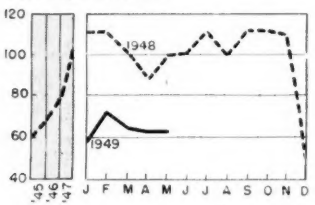
Malt Liquors Rise



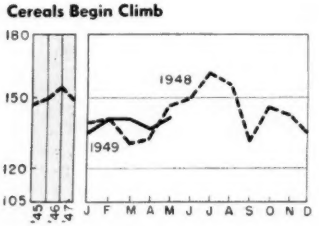
Candy Keeps Skidding



Beet Sugar Stays Low



Cereals Begin Climb



There is a difficulty in using this method. Productivity is measured only once a year. Spreading changes equally throughout the twelve months is not strictly accurate. However, output per man-hour usually changes only slowly from year to year (it has been increasing, for the country as a whole, at the rate of about 3 percent a year, or ¼ percent a month.

There are other reasons why the FI index does not behave like that of the FRB. For one thing, the Board's index includes in its "Other Food Products" group two industries that are not in our index—processed fish, and feeds. For another thing, our index is adjusted for seasonal changes in a way different from that of the Board index. FI discovered, in studying the food-processing industries, that changes in consumer tastes and in processing technics also change the effects of the four seasons on food production. Adjustments for seasonal influences vary somewhat yearly.

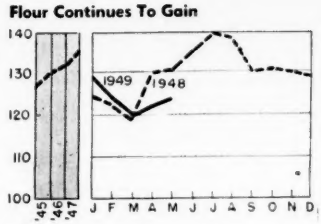
The Board, on the other hand, uses constant seasonal adjustments—the same adjustment for each month every year. After several years, such fixed adjustments may no longer be typical of the seasonal pattern in the industry. These adjustments are revised at intervals, of course. But the difference in principle—the construction of seasonal adjustments by averaging out a long period of historical experience versus the development of the adjustments on the basis of current trends—results in differences in the movements.

With all these differences—in coverage, "weights", and methods of allowing for seasonal changes—the two indexes would seem, at first glance, to be at odds. But the variation is only one of approach.

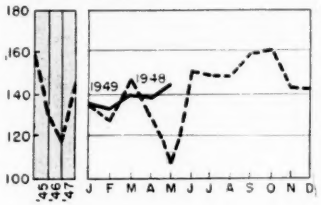
Index Comparisons

	'35-'39 weight FRB	'47 weight FI
	Percent of total	
Items In Both Indexes		
Slaughtering	10.5	17.2
Cond. Milk	1.7	2.2
Ice Cream	4.5	4.3
Flour	4.9	3.4
Cane Sugar	2.1	1.3
Confect.	8.7	6.9
Canning	13.1	25.0
Butter	3.6	1.8
	48.5	62.1
In FI and Included In FRB "Other"		
FRB Other	50.9	....
Baking	....	25.6
Cereal	....	1.3
Beet Sugar	....	1.3
Beverages	....	3.0
	50.9	31.2
In FI, Not In FRB		
Malt Liquors	....	5.7
Margarine	....	1.0
In FRB, Not In FI		
Cheese	.6	....
Total..	100.0	100.0

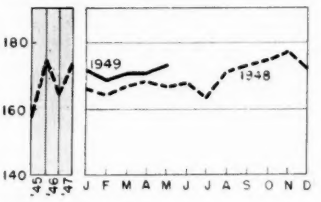
Flour Continues To Gain



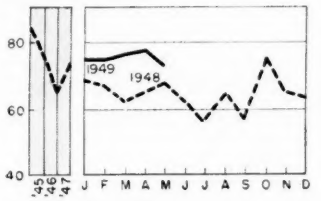
Meat Moves Higher



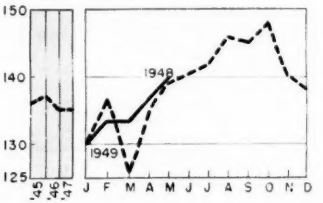
Condensed Milk Holds On



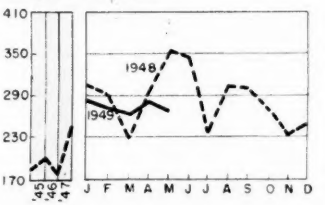
Butter Takes Slide



Baking Still Goes Up



Margarine Falls Off



A significant development for VANILLA USERS

Alvanya

(imitation vanilla absolute)

is an important research product of the vanilla absolute type that duplicates the flavor of true vanilla beans, including the important aromatic qualities that are not contributed by vanillin.

ALVANYA alone will provide a vanilla flavor of unusually true fidelity.

ALVANYA's flavor strength is 40 times that of true vanilla.

ALVANYA will improve any vanilla flavor, true or imitation, and it is remarkably effective when added to the exhaustively extracted "pure" vanillas with which the market is currently flooded.

ALVANYA will provide an outstanding flavor when used to replace true vanilla in a vanilla-vanillin mixture and will contribute a vast flavor improvement when used to replace all or part of the vanillin constituent.

ALVANYA has superior stability under extreme temperatures, both low and high.

ALVANYA costs only $1.90 lb., in 25 lb. lots, or more.

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New Packages and Products

Appetizing Tidbits Flavored With Bacon

Cocktail party-goers will now find themselves nibbling Piff-O-Puff, a new bacon-flavored, chip-like appetizer.

The tangy, pink and white fried chips are light and fluffy, giving the appearance of masses of solidified bubbles. Tapioca flour, potato flour, corn starch, cheese, hydrolyzed plant protein, vegetable shortening, bacon, smoke flavoring, salt and U. S. certified color are the ingredients.

Packed by Swiss American Food Co., Chicago, 1¾ oz. of the tidbits are offered in a large 7-in.-high tin container.

The wrap-around label highlights a white explosive cloud on which the tradename is printed in blue. Other printing is brown against a background of gayly-colored chips.

Redesigned Labels Increase Vinegar Sales

Over 30 percent higher sales are credited to Pee Gee California Wine Vinegar's redesigned labels.

Walter Landor & Associates, San Francisco, developed the new labels with the particular aim to suggest quality, to give instant identification of product and brand, and to harmonize with the wine's color.

Initials of the manufacturer were magnified in pure white with heavy shadows cast against a tapestry-like background of finely drawn wine grape clusters and leaves.

Product identification was given similar positive display in the horizontal white band across the center. Here the word "Vinegar" was made largest for instant recognition. Amount of contents and the maker's name were subordinated, being shown in small reverse white letters on the lower marginal blocks of color.

Fresh yellow, maroon, deep green and red on the new labels bring out the rich color of the red wine vinegar and enhance the gold of the white wine seasoning.

Adaptable for mass or single displays, the new labels guide the shopper's eyes first to the brand and then to the product identification.

Perishable Foods Can Be Shipped Without Ice

Non-refrigerated shipments of seafood, fresh poultry and other perishables are now reported practicable using an economical lightweight package developed by the Hinde & Dauch Paper Co., Sandusky, Ohio.

Registered under the tradename "Insulpak", the container comprises a regular lap-end shipping box specially lined with 1-in. layers formed of heavy corrugated paper in multiple. These layers insulate the inside walls of the box, eliminating the need for ice or dry ice.

Thermokraft, the insulating paper, is clean and easy to handle. It can be cut to fit any shipping box, and it adds additional strength to the container.

The new packaging has been subjected to extensive laboratory and field tests during the past two years. These involved long-distance shipments of oysters, fish, shrimp, lobsters, turkeys and other foods, all without refrigeration.

Fresh oysters, for example, were first shucked, then sealed with their natural juices in a Pliofilm bag, next precooled in cold storage, and then placed in the shipping boxes. The low temperature of the packed bivalves was retained in shipment, since heat loss was gaged as only 0.6 of a degree per hr. at 75-85 deg. F. This indicated that if the oysters were cooled to 41 deg. F., the temperature would rise to but 47 deg. in 10 hr.—ample time for air shipment from Boston to St. Louis.

(Packages and Products Cont'd)

HOW TO IMPROVE A STANDARD DESIGN

THIS IS A GOOD EXAMPLE of how Armstrong's expert packaging designers can take a standard design and improve it. Refrigerator jar covers can contain a sales message as this "before and after" illustration shows. The company name, imprinted on the cap, reminds the user each time the cap is taken from the refrigerator jar. This is but one example of how Armstrong's designers can improve a cap design. They might be able to do the same for you. Just by adding the product name, a trade-mark, or developing an entirely new design, your package becomes more outstanding, gains individuality . . . helps build sales. Sparkling color can be added for a fraction of a cent per cap. For design suggestions, send sample package and complete market information to Armstrong Cork Company, Glass and Closure Division, 4208 Prince Street, Lancaster, Pennsylvania.

Armstrong's Closures

TURN STANDARD CONTAINERS INTO STANDOUT PACKAGES

WEST COAST REPRESENTATIVE: I. F. SCHNIER CO., INC., SAN FRANCISCO 7 AND LOS ANGELES 12

For Low-cost Labeling—

They Like the NORTON Labeler

Production line breakdowns in a food plant can be really disastrous. That's why in this Dallas plant of Morton Foods and in hundreds of other plants the country over, they like the sure, dependable operation of the NORTON Labeler.

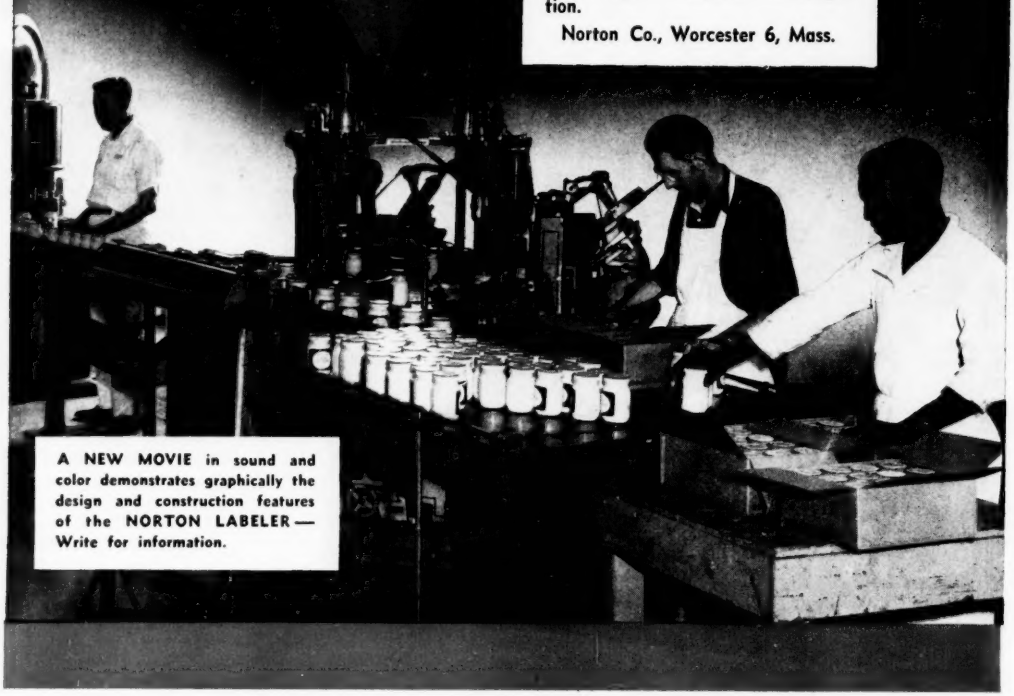
The simplicity of design that gives long, smooth, trouble-free operation is based on 35 years of Oslund experience in designing and building labeling machines.

The sturdiness of construction and high quality workmanship are based on Norton Company's 49 years of experience in building high precision machinery.

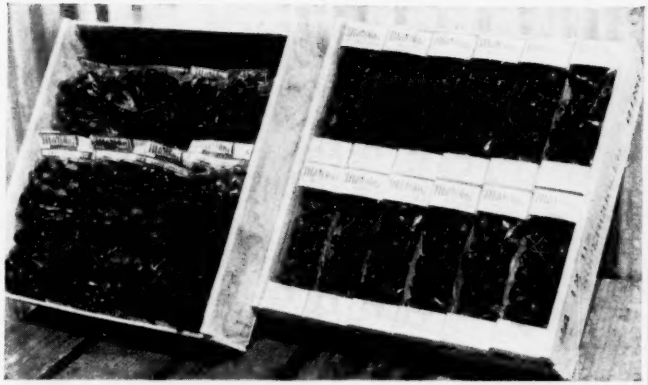
Catalogs on request—no obligation.

Norton Co., Worcester 6, Mass.

NORTON
AUTOMATIC LABELERS



A NEW MOVIE in sound and color demonstrates graphically the design and construction features of the NORTON LABELER—Write for information.



Cherries Boxed In New Display

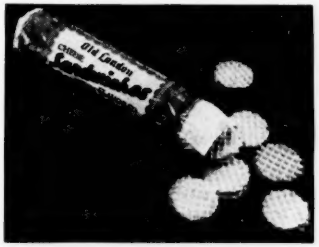
California Bing cherries are now being put up in clear-view, consumer-size, carry-away boxes by Paul Mariani, Cupertino, Calif., who believes this to be the first such package offered.

The fruit is pre-cooled prior to filling in the protective boxes, which have attractive display and practical storage features.

Packer states that the new high-visibility container has advantages over his previously developed acetate bags (shown at left in photo). Both hold 12 oz. of cherries. Experimental work in packing cherries in small consumer boxes began about 4 years ago.

To check consumer acceptance of the new styling, the package is being market-tested by two major grocery chains operating in New York, Chicago, Cleveland, Buffalo, Boston, Toledo, Philadelphia, Dallas, Salt Lake City, and Los Angeles.

Fleishhacker Paper Box Co., San Francisco, is the designer and supplier of the package.



Tangy Cheddar-Flavored Tidbits

Wrapped in bright red and yellow laminated cellophane, Old London cheese-flavored sandwiches are now being introduced in the New York City area.

The dainty tidbits are made from sharp cheddar cheese and crisp wafers that have a texture somewhat like ice cream cones. Ingredients listed on the wrap are: Cheddar cheese, wheat flour, cocoanut oil, vegetable oil, salt, egg yolk and certified color added. Each package weighs 3 oz. and contains 24 sandwiches.

King Kone of New York is the manufacturer and Milprint, Inc., supplies the wrapper.

Frozen Foods Relabeled

Attractive new labels now feature the entire line of merchandise sold by Little America Frozen Foods Inc., Pittsburgh.

Natural-looking, color photos of the packages' contents comprise the prominent element of the labels' design.

The company reports that only Grade A fancy food is going into these packages, which are being distributed in 17 states. Photostat copies of government inspection reports are furnished on request.

(Packages and Products Cont'd)

For bakeries and other food processing plants where a finished product intended for human consumption comes in contact with the conveying belt, BUFFALO PlasTex Belting is the "best bet".

The glossy surface of PlasTex Belting is easily brushed off, washed, or cleaned with live steam. The washable plastic is compounded for extra wear and great flexibility.

For best service where hygienic conditions are most important . . . specify BUFFALO PlasTex Conveyor Belting.

**PlasTex is the registered trade name for Buffalo Weaving & Belting Company's plastic-covered belting. Makers also of RF & C (rubber covered), latex, solid-woven cotton, and glazed (nitro-cellulose coated) beltings.*

Get the whole PlasTex story, and a free sample. Write today.

BUFFALO
WEAVING & BELTING CO.
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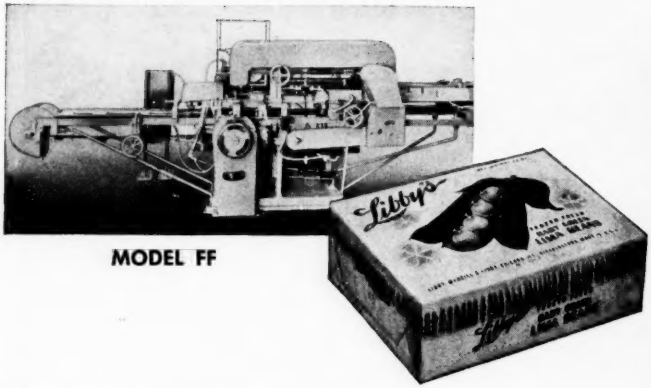


MODEL FF

Today's most advanced Frozen Food Wrapping Machine

WRAPS CARTONS AND METAL-END FIBRE CANS

In the relatively short time since its introduction our Model FF Frozen Food Wrapper has become a favorite from coast to coast. Designed specifically to meet the needs of the frozen food industry, it does this job so well that it is being adopted by more and more of the country's leading packers.

The Model FF produces a PERFECT wrap on both cartons and metal-end fibre cans, using either plain or printed wrapping material. Moreover, it is quickly adjustable for various sizes. This broad adjustability enables you to maintain a *uniform appearance for your entire pack*. Packers also find the use of printed wrappers on metal-end fibre cans a welcome economy . . . It eliminates the expense of printing small quantities of these cans for each given brand, and the need of stocking a variety of such cans.

The product can be wrapped either before or after freezing, because the FF automatically makes allowance for variations of up to ⅜" in the width of packages.

Speed—well over 100 packages per minute.

If you are seeking attractive, low-cost, trouble-free wrapping, get all the facts on the Model FF — the packer's favorite frozen food wrapper.

Consult our nearest office today.

PACKAGE MACHINERY COMPANY
SPRINGFIELD 7, MASSACHUSETTS
NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

Sea Scallops In Cans

Called a very promising food innovation, canned sea scallops are now being offered by Cape King Fisheries, Inc., New Bedford, Mass.

The seafood is harvested from the Atlantic Ocean, quickly precooked, then vacuum-packed to retain its flavor and high nutritive value. Salt, water, citric and ascorbic acids are added.

Net weight of the 4½-in.-high cans is 14 oz. Labels are attractively lithographed in deep blue, yellow, white and red, with a salty effect neatly achieved by the background showing a white fish net against sea blue.

The Stecher-Traung Lithographing Corp., New York City, supplies the labels, which were designed by Iver Gilborn of Food Industries of America, N. Y.,—distributor of the product.

In addition, Atlantic Mackerel, with monosodium glutamate added, is being offered in a similar can.

Cheese Flavor

Synthetic cheddar cheese flavor for use in the preparation of cheese tidbits and other cheese foods is being produced by Dairyland Food Laboratories, Inc., Waukesha, Wis.

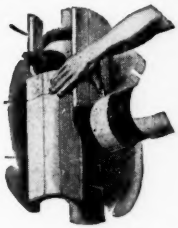
Sold under the brand name Chedrin, the flavor is not a substitute for cheese, but is said to enhance and intensify the flavor of the cheese being used. The company states that about 1 cc. of the product per pound of cheese changes the flavor from mild to aged.

(Packages and Products Cont'd)

HOW WOULD YOU INSULATE THIS FLANGED FITTING?

4" line requires 85% Magnesia 2" thick on all surfaces, including fittings. Which form of insulation is best for the flanged fitting shown here?

☐ **85% Magnesia cement built up to a total thickness of 1½", then ½" asbestos cement applied in two coats.**



☐ **85% Magnesia block, carefully fitted, wired in place and finished with asbestos cement.**

HERE'S HOW AN ARMSTRONG FOREMAN DID IT:

Whether to use block insulation on a fitting, or to cover it with built-up cement, is a decision that is usually left to the foreman on the job. Both methods are widely used, but the correct choice depends mainly upon the size of the fitting. In the case outlined above, the Armstrong foreman directed his workmen to use method No. 2. For fittings on pipe lines 4" and larger, this method is always more satisfactory. It is faster than laboriously building up the fittings with multiple layers of cement. Also, it eliminates the shrinking and resultant cracking that occurs when built-up cement is used to insulate a fitting of this size.

On pipe sizes smaller than 4", a neat, efficient job can often be done with cement. However, the size and complexity of the fitting must be taken into consideration, and the most satisfactory method selected for the insulating job at hand.

How well the foreman makes his decision can affect the final appearance and efficiency of every insulation job where covering a fitting is called for in the specifications.

Foremen on Armstrong jobs, as well as Armstrong's own construction superintendents and sales engineers, are trained to make the right decisions. There's no blind rule of thumb. When you call upon Armstrong's Contract Service for heat insulation, your needs, and the requirements of your job, determine the methods used.

FREE BOOKLET

Write today for 28-page booklet, "Armstrong's Industrial Insulations." It contains a chart listing types and thicknesses of insulation for all temperatures. Armstrong Cork Company, 4208 Maple Ave., Lancaster, Penna.

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service
For All Temperatures

From 200° Below Zero

To 2800° Fahrenheit

LONG on work but SHORT on the payroll

An ideal worker . . . Certainly! And a Wallace & Tiernan chlorinator is an ideal worker because it applies the In-Plant Chlorination process to your fish cannery, frozen food, or canning plant.

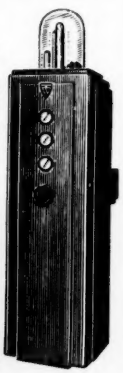
The In-Plant Chlorination process cleans, sterilizes, and deodorizes, thus saving you time, trouble, and money.

It saves you time because this process reduces the length of the clean-up period.

It saves you trouble by preventing slime growth on floors and equipment and by eliminating off-odors.

It saves you money by lowering the cost of clean-up, preventing product contamination, and by increasing production.

Call your nearest W&T Representative and he'll gladly give you complete information on how this machine applying the In-Plant Chlorination process will reduce your costs and increase your profits.



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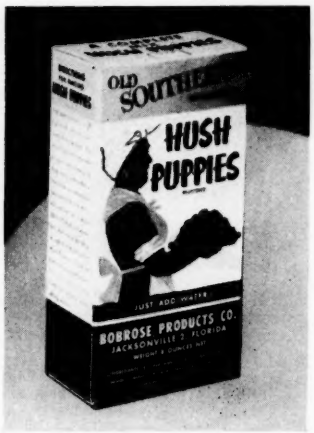
WALLACE & TIERNAN COMPANY, INC.
CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES



Hush Puppies Easily Made

Preparation of Hush Puppies no longer depends on traditional regional skill. A famous old Southern recipe for making them has been developed into a dry mix which requires only the addition of water to make batter for the finished product.

The mix is manufactured and packaged by Bobrose Products Co., Jacksonville, Fla. The recipe is one used in early days around Tallahassee.

Package is 5¾-in. high, holds 8 oz. of mix, and has complete directions for preparation. Ingredients include: Enriched waterground cornmeal, baking powder, nonfat milk solids, dehydrated onions, onion powder and other spices.

Filberts Vacuum Packed

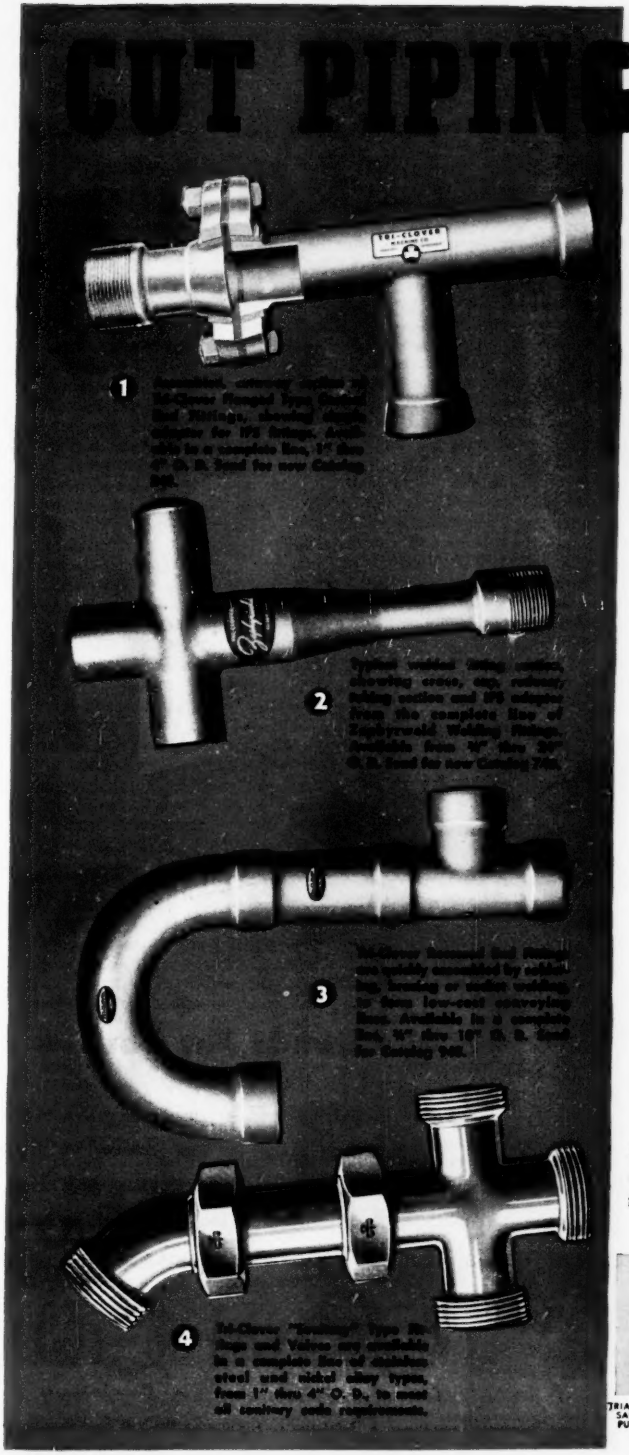
Filberts grown in the valleys of Oregon and Washington are now, for the first time, being vacuum packed. Processor is the Ambernut Co., Portland, Ore.

Heretofore, the Northwest filbert growers have sold their produce almost exclusively in-shell for use in holiday nut mixes or directly to confectioners and bakers. Now, in a new marketing approach, the nuts are packed in three forms—(1) whole roasted kernels in 7½ oz. glass jars, (2) chopped bits in 6½ and 12 oz. glass jars, and (3) filbert flour in 6½ oz. jars.

A novel gift pack has also been developed recently. It consists of a fine box holding two jars of chopped nuts and one jar of the whole kernels—all bedded down with in-shell filberts.

The new packages were developed by the manufacturer, while Joseph R. Gerber Co., Portland, designed the labels. The jars are supplied by Owens-Illinois Glass Co. —*End*

CUT PIPING COSTS



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featuring . . .

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- LOW UPKEEP
- STREAMLINE CONSTRUCTION
- FULL CORROSION RESISTANCE
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- POCKETLESS
- LEAK-TIGHT
- READILY ADAPTABLE TO OTHER FITTINGS

See your Tri-Clover Jobber for details, or write for catalogs covering any of these four basic fitting types.

Tri-Clover
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

TRI-CLOVER
THE Complete LINE

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

We Stand On Our Heads For You!

One very big reason for using Crown Cans is simply this: *We Stand On Our Heads For You!* Our young, alert, progressive *Service Staff* has been trained, saturated, *enthused with the Idea of Service to the utmost—to do everything humanly possible for each Customer.*

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Food Industry News

RFC Granting Food Packer Loans To Provide Working Capital

Food processing companies that can no longer finance themselves through regular credit channels have been hurrying to the Reconstruction Finance Corp. That is why RFC's business has been booming. Most of the food processing and other applicants are getting loans. So RFC's volume is away out in front of its earlier postwar business.

Through the last three months for which figures are available—February, March and April—applicants for RFC loans from all industry have averaged 838 a month—about 40 percent above the monthly average for all of 1948.

In dollar terms, the rise has been even sharper; borrowers are now asking for twice as much as they did last year—about $120,000,000 a month. Food processing companies alone have asked for 242 loans during the same months. The total amount involved was $26,270,000.

Right now RFC is granting about three-fourths of all applications. This is an abnormally high proportion—but at this point in the business cycle, a large share of the would-be borrowers represent what would normally be pretty fair risks, temporarily strapped for capital.

Profitable Loans

These loans should mean good business for RFC and more profits for the government, which puts up the corporation's $2,000,000,000 lending fund. Actually, of course, they are a sign that more and more enterprises are finding the going tough.

RFC was set up by Congress back in 1932 to act only as a lender of last resort. The corporation was specifically told not to lend to anyone who could get the money elsewhere. To qualify, an applicant has to show that he has tried to get a loan from his banker and has been turned down. So when RFC makes a business loan today, it implies that no one else will touch it.

On some of the applicants, the private lenders are just playing safe—and smart. A lot of businesses that mushroomed after the war, and rode high during the boom, are in no condition to live competitively. Money loaned now would soon evaporate. Even RFC is steering clear of these.

But just because a business is seeking RFC aid, it is not necessarily heading into bankruptcy. Some firms in otherwise robust financial condition want new capital for legitimate expansion. And they do not think they can get it by security flotation.

Other firms have permitted growing inventories to tie up too much working capital. Though by no means insolvent, they are in urgent need of cash. But more and more the banks are saying no to their requests.

Here is a sampling of typical food processing firms that recently brought their problems to RFC and got help:

Lose Packing & Cold Storage—This Nebraska meat packing and cold storage firm asked the RFC for a total of $11,000—$6,000 to be used for construction, machinery and equipment, $5,000 for working capital and debt payment. The loan was granted.

Christensen Meat Co.—The RFC granted a loan of $50,000 for working capital to this Oregon concern, which specializes in wholesale meat packing and rendering.

Beavers Packing Co.—A loan of $54,000 for working capital and debt payment was received by this Georgia meat packing and sales company.

Ebner Brothers—RFC has loaned $100,000 to this Texas meat packing company to add to its working capital.

Miller Brothers & Co.—This Pennsylvania company, manufacturer and processor of meat products, received a loan of $250,000 from RFC for debt payment.

Wenatchie Foods, Inc.—RFC granted this Washington fruit and vegetable cannery a loan of $500,000 to be used for working capital.

Juice Industries, Inc.—This Florida corporation, which produces juice concentrates, was granted a loan of $1,500,000 by RFC to increase its working capital.

Co-op Food Processors Use Their Own Labels

Cooperatives market more than three-fifths of their canned and frozen fruits and vegetables under their own brands, according to a survey made under the Research & Marketing Act and summarized in Miscellaneous Report 130 of the Farm Credit Administration.

The survey revealed that the price at the beginning of the season is usually determined by the cost of the pack plus one other factor such as "sufficient margin" or "a fair return to growers." More than half of all co-op processors make at least part of their sales on contracts prior to processing, the survey showed. About three-fourths of their total sales are through brokers, and about 95 percent of co-op canned and frozen fruits and vegetables are sold f.o.b.

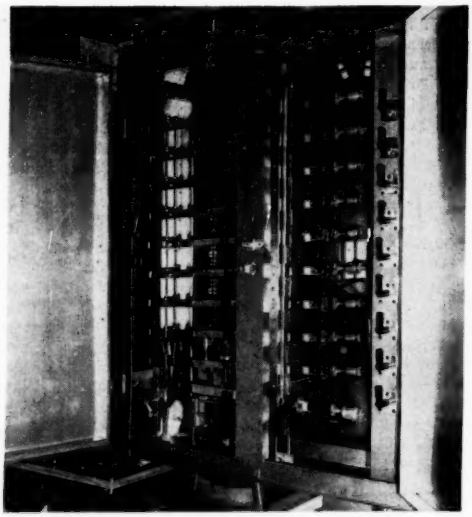
(Industry News Continued)

Wide World

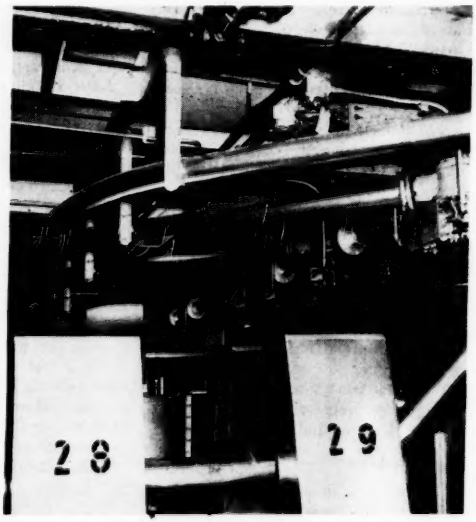
Educated Wheat

Ingenuity helped get this Texas grain under cover, when several growers bought an old school building near Vernon. The "granary" came complete with blackboards, lights and other perfectly useless adjuncts for storage of wheat.

PILLSBURY'S new bakery mix plant at Springfield, Ill., with its 110-ft. storage tower is shown in the foreground. Flour is fed pneumatically from the mill across the rail siding. Accent is on electronic control.



ELECTRONICALLY OPERATED multiple beam scales form part of the automatic controls at the plant.



HERE are some of the pipes that feed flour pneumatically from the mill and from storage bins to mixing bins.

New Pushbutton-Control Bakery Mix Plant Put Into Operation by Pillsbury Mills

Pillsbury Mills, Inc., has opened its new, automatic bakery mix plant at Springfield, Ill.

Costing more than $1,000,000, the pushbutton-controlled plant is completely automatic and is one of the most modern of its type in the world. It is designed to make pre-mix food products for bakery, hotel, restaurant and institutional trades.

The plant will produce five products—1. Doughnut mixes, both cake doughnut and yeast raised. 2. Sweet dough mixes. 3. Cake base mixes. 4. Doughnut coating sugar. 5. Institutional type mixes.

Electronic controls will govern multiple-beam scales for weighing ingredients, will time mixing operations and maintain correct temperatures, and will control the flow of materials through the entire plant.

The building is divided into office, laboratory, warehouse and manufacturing areas. The second floor is occupied by offices and laboratories, while the manufacturing is done in the tower. The offices and laboratories are air conditioned for humidity and temperature. The two warehouses—raw materials warehouse and finished products warehouse—and the manufacturing area are controlled independently at different suitable temperatures.

In the tower, 30 ingredient bins are used for manufacturing storage space. The tower can hold ingredients to operate the plant for two 8-hr. days.

The process involves five basic steps: Intake of ingredients, storage, sealing and weighing of materials, mixing, and packing.

Flour is obviously the most important ingredient. It comes pneumatically from the nearby mills and is poured into the tower storage bins. Sugar is delivered in bulk sugar cars, dumped at a rail unloading point. From there it is also pneumatically carried to storage bins on the first floor. Liquid shortenings are pumped to storage tanks in the tower, while other materials are warehoused.

Cannery Union Organizing Seen Moving Eastward

Eastern and middle western canneries are targets for a highpowered organizing drive by the International Brotherhood of Teamsters. The AFL union considers organization of processing workers as a step toward signing up warehousemen and truck drivers.

The drive will be conducted by the union's newly-organized Cannery Division, one of the Teamsters' 15 recently authorized national trade divisions.

The Teamsters feel they are helping the well-organized West Coast canneries by reducing the competition of lower wages in the less-organized eastern and middle western canneries.

In order to protect the status of union members in the west, the Teamsters' Cannery Division regards it as absolutely essential to bring cannery workers from other parts of the country into the union.

Teamsters' Vice-President Dave Beck puts it this way: "We have got to look at the canning industry from a national standpoint. If low wages prevail in one section, they are bound to influence the wage structure of another section."

The union's objective extends beyond the processing workers. Teamster officials claim that well-organized cannery operations can be a tremendous influence in many communities in bringing about the organization of warehousemen and truck drivers.

Beck says there is a "great organization bond that exists between the cannery worker, the truck driver and the warehouseman," and that "experience has proved that a stabilized cannery organization helps to organize every type of driver going in and out of every cannery."

For the 1948 pack, the U. S. Census Bureau reported cannery employment was 444,000 at the peak in September. Lowest was 136,000 in March. The West Coast alone had 125,000 in peak season.

Omar Sells Flour Mills To Colorado Milling

Sale by Omar, Inc., Omaha, of its flour mills, elevators and prepared mix plant to Colorado Milling & Elevator Co., paves the way for Omar's return to the house-to-house wholesale baking business under which the company, as the National Baking Co., started back in 1925.

Changing its name in 1938, after taking over Omar companies in Indiana, Ohio, Wisconsin and Nebraska, the company operated as two divisions. The milling division had plants in Omaha and Denver and the bakery division operated in Omaha, Columbus, Ohio, Indianapolis, Milwaukee and Hamilton, Ohio.

Conflicting interests between the two divisions appear to be the principal cause of the split. The flour mills were experiencing difficulty in selling flour to outside bakeries because of the competition the expanding bakery division was imposing on these other bakeries. And even between the two divisions, freight differentials often made purchases from the milling division unprofitable when the baking plant was at considerable distance, as was most often the case.

Added to the difficulties was the decline in home baking, which made it impossible for the mills to sell all the surplus flour through retail outlets, either as family flour or mixes.

In disposing of the milling division, Omar finds itself with five central bakeries in place of the one it had in 1925. And it now has 17 distribution plants, whereas previously it had none. A new branch plant was opened in Mansfield, Ohio, in May, and plans are under way to open three more—at Lafayette, Richmond and Rushville, Ind.

The Colorado company is reverting to the mills' original name—Omaha Flour Mills—for its new acquisitions. All department heads are being replaced, the resignation of plant manager C. E. Baker, Jr., having been announced late in June.

Expansion Program Begun At Texas Refinery

Immediate construction of a $242,000 sugar processing building at the refinery of the Imperial Sugar Co., Sugar Land, Tex., is planned as part of the firm's $4,000,000 building program.

I. H. Kempner, Jr., president of the company, said the new six-story re-melt building, housing the latest sugar processing equipment, will be of steel and concrete construction. He said the contract has been awarded and construction will start soon.

The Imperial refinery, unique in Texas because it is the only cane sugar refinery between Louisiana and San Francisco, began the current improvement program in 1947.

Major units in the program include a new warehouse for storage of kraft paper containers, a large research and testing laboratory, two water treatment plants, and installation of new power plant equipment.

Under present construction is a 2,000,000 lb. capacity stainless steel sugar storage bin and a new packing department.

(Industry News Continued)

OVER 7000 management men and specialists interested in cost reduction through protective packaging and efficient materials handling will attend the . . .

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4th annual industrial packaging and materials handling exposition

OCT. 4, 5, 6, 1949
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We offer a complete custom service from sketch to a finished product that is exclusively yours.
We also manufacture a complete line of round cans with stock designs for candies and cookies.
Let Empire quote on your requirements. We should get acquainted.
"No other container protects like the can"

Empire Can Corp.
228 Ashford St. Brooklyn 7, N. Y.
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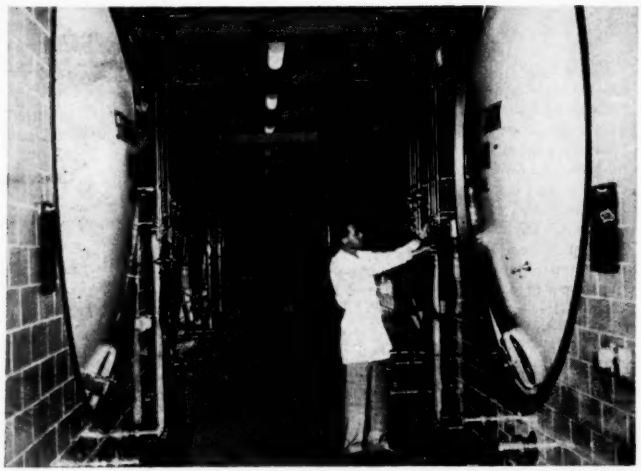

Ample Beer Storage

Acme Brewing Co., Veron, Calif., has just completed a multi-million dollar development in new buildings and equipment, which includes four floors of storage cellars where its product can age to maturity.

BLS Reports on Findings In Food Field Survey

A survey by the U. S. Bureau of Labor Statistics of the hours and earnings of workers in the food processing industry last year is reported in the July issue of BLS' monthly publication, *Monthly Labor Review.*

The survey covered fruit and vegetable processings in 11 states, also seafood processing—freezing and canning—in four states. Here are the highlights:

In fruit and vegetable processing, during the first nine months of 1948 three states—Arkansas, Indiana, and Wisconsin—averaged about 11 weeks. Only four of the 11 states averaged over 20 weeks of the potential 39. Longest processing period was in Illinois, with an average of 24 weeks. This was because Chicago specialty firms, operating the year round, brought up the average. Otherwise, the longest periods would be in California.

Work shifts: Third shifts are uncommon. Many plants in California, Oregon, Washington and Wisconsin operated second shifts. West Coast plants paid a shift differential, usually 5¢ an hour.

Hourly earnings: Average hourly earnings last fall ranged from 53 and 54¢ in Louisiana and Arkansas, respectively, to $1.16 in California. Three other states—New Jersey, with $1.07; Washington, with $1.05, and Oregon, with $1.04—had averages higher than $1 an hour.

Women earned between 10 and 20 percent less than men.

The size of the community seemed to have no relationship to the wage paid. In Washington and Oregon, for instance, the workers averaged a little more in the smallest communities.

Weekly hours worked: Hours ranged from only a few to more than 100 per week. Women worked fewer hours than men. During the peak season, in California, men averaged $61.70 for 49 hr., while women averaged $43.83 for 41.5 hr. Highest weekly hours were in Illinois, where men averaged 57.6 hr., earning $59.90, and women averaged 42 hr., earning $36.67.

Hope to Get Research Plan Rolling By This Fall

After four years of trying, Congress is finally going to set up a National Science Foundation to promote research in universities and laboratories.

The Priest Bill, recently approved by the House Interstate Commerce Committee, meets the objections President Truman had against legislation he vetoed two years ago. And Rep. Priest of Tennessee is pretty sure he can get the green light to put the law through the House before summer adjournment. The Senate already has voted a similar bill. The plan is to get the program started this fall.

The proposal puts federal government into the business of developing such sciences as mathematical, engineering, physical, medical and biological. Cost will be roughly $15,000,000 in the first year, stepping up to $25,000,000 a year when the program is in full sway.

In brief, the Science Foundation will:

(1) Maintain a register of scientific and technical personnel, and provide a clearing house for information covering scientific and technical personnel.

(2) Award scholarships and graduate fellowships to students for basic research—the awards will total roughly $2,500,000 a year.

(3) Contract with universities and laboratories for scientific research in the various fields such as engineering and physics—the contract authority is budgeted at a sum of $12,500,000 for the first year.

The Foundation would consist of four divisions to direct research in medicine, engineering, mathematical and physical sciences, biological sciences and scientific personnel and education.

Major difficulties the program has had in the four years it has been before Congress were over the administrative set-up, and the question of patent rights.

Truman vetoed the only measure Congress sent him because the proposed governing board of the Foundation would have been practically autonomous. The Priest bill provides that major executive functions will be in the hands of a $15,000-a-year director responsible to the President.

Streamlining and Selling Seen as Industry Jobs

Facing lowering prices and fixed costs over which they have little control, food and grocery manufacturers, attending the mid-year meeting of the Grocery Manufacturers of America, at Virginia Beach, were warned to look to increasing efficiencies in production and distribution, and to a higher sales volume if they hope to achieve satisfactory profits.

Food processors, particularly, agreed with Hector Lazo, Sunshine Biscuits Co., that quality would be maintained and that cost cutting would be accomplished by accelerated installations of modern plant equipment and streamlined production technics.

The selling job confronting producers was pointed up by GMA President Paul S. Willis. There is ample consumer buying power, he declared, and a continuing demand for quality foods. Per capita consumption in 1948, he said, was 1,600 lb., compared with 1,475 lb. in 1935-39. To hold this interest in good eating is one of

the principal selling jobs. Food producers are generally optimistic, he continued, and with good reason. Purchasing power, after full correction for both taxes and prices, is 53 percent higher than in 1940 and was 6 percent higher in the first quarter of 1949 than in the first quarter of 1948. Moreover, the country's population has increased by 17,000,000 since 1940, with 6,000,000 new households.

Wants Public Warned

Better public relations programs "to awaken the American people to the inherent dangers in our present drift toward planned economy and the welfare state," were urged by a panel of three speakers: W. M. Robbins, vice-president, General Foods; Victor Lea, economist, Standard Brands; and C. W. Dunn, GMA counsel.

Declaring that the history of the world proves that planned economy cannot succeed, but that "the American people don't seem to want to take a lesson from history," Mr. Lea said that the myth that a government can create economic security has been exploded time after time. It actually creates economic stagnation, he said.

As an economic forecast, Mr. Lea thought that food prices, at all levels, would continue to decline for the rest of the year and that the wholesale grocery price level next December would be approximately 16 percent below the present level.

Willis H. Gurley, vice-president, The Borden Co., warned the grocery men not to seek foreign markets for their goods unless they were prepared to merchandise and advertise their products abroad just as aggressively as they do in the domestic market. He also urged producers to first make a scientific study of the eating and dietary habits of the people in the foreign markets they plan to enter.

(Industry News Continued)

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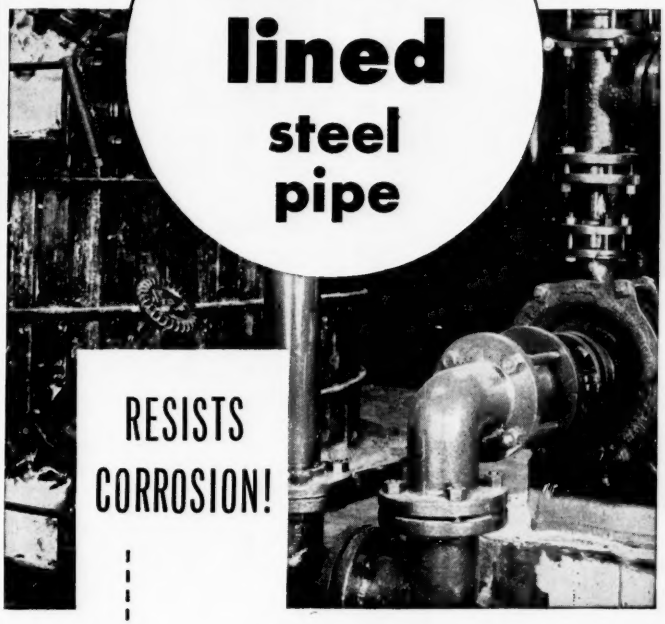

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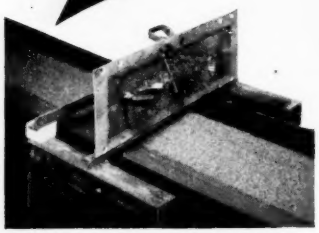

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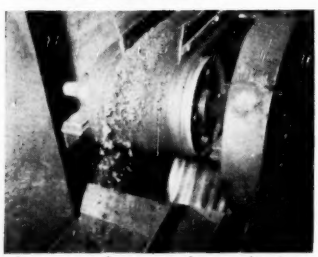

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Pricing Fight Broadens Into Bigger Battle

The fight in Congress over basing point pricing is no longer a fight over whether cement manufacturers or steel producers can absorb their freight costs. Now the question is whether the Robinson-Patman Act, protecting the so-called small wholesaler and retailer, is to be weakened or not.

Rep. Wright Patman is lining up druggists, grocers and other small business against the O'Mahoney Bill, and he may block all legislation on the subject—in this session at least. That is what has developed in the House of Representatives since Sen. O'Mahoney put through a bill in the Senate on June 1 to clarify pricing practices.

It will be recalled that when the U. S. Supreme Court handed down its decision in the Cement Institute Case last year the whole question of legality of freight absorption was opened wide. The Court found that cement basing point pricing violated the anti-trust laws. And the Court followed through last spring with a decision in the rigid steel conduit case underlining and expanding the Cement Institute decision.

Abandons Moratorium

Sen. O'Mahoney discarded the idea of putting a moratorium on the question of delivered pricing and instead got the Senate to vote permanent legislation. The idea of the moratorium was to direct the Federal Trade Commission to let up on its basing point activities until Congress and industry could settle on what effect the Supreme Court decision would have on business.

Sen. Kefauver of Tennessee made one change in O'Mahoney's Bill. Kefauver's amendment modified O'Mahoney's good-faith clause by restating the policy of the Robinson-Patman Act that a price discrimination, whether or not made to meet competition in good faith, would continue to be illegal if it substantially lessened competition. That is, a small business man is not so strong that he can live if a competitor lowers a price—even in good faith—that the small man can't meet.

Good-Faith Clause

O'Mahoney accepted Kefauver's language because O'Mahoney's main concern was to clear up the delivered-price muddle for sellers. If the buyer would be happier with a restatement of the Robinson-Patman act policy, O'Mahoney was willing to provide it.

So the O'Mahoney bill went to the House amended that way. There, however, the Kefauver amendment ran into trouble. Rep. Francis Walter of Pennsylvania, who is in charge of the legislation, asked the House Judiciary Committee to eliminate the language about "lessening competition" and to restore unfettered the good faith clause. Walter had backing from Herbert Bergson, chief of the anti-trust division of the Department of Justice. And the Judiciary Committee approved the O'Mahoney bill without the amendment.

Patman, who never was more than tepid about the O'Mahoney bill, now is up in arms against it. He wants no legislation on delivered-pricing to go through Congress. And the House Judiciary Committee's strike at the

Robinson-Patman Act, which he co-authored in 1936, has given him ammunition for a real battle.

He immediately lined up the small business trade organizations against the O'Mahoney bill, and got a promise from Rep. Sabath of the House Rules Committee that Sabath would do all he could to delay a House vote on the legislation.

Patman's tactic is to have his Small Business Committee investigate the whole pricing front.

Two F&D Associations Merge in the South

Southern States Association of Food & Drug Officials has been formed, merging the Southeastern association, covering the two Carolinas, Georgia and Florida, and the South Central group, covering Alabama, Tennessee, Mississippi, Louisiana and Texas.

The merger took place at the annual meeting of the two groups held in Biloxi, Miss. Provision has been made for other states in the South to join as charter members.

The new association elected J. J. Taylor, Florida state chemist, as president. Other officials elected included J. F. Lakey, chief of Bureau of Food & Drugs, Austin, Tex., vice-president; and E. K. Tucker, chief food chemist of Alabama, Montgomery, secretary-treasurer.

Named to the executive committee were: Dr. E. W. Constable, state chemist of North Carolina, Raleigh (2 yr.); and Dr. H. C. Ricks, food and drug commissioner of Mississippi, Jackson (1 yr.).

M. P. Ethridge, Jackson, Miss., state chemist, pointed to the advantages of the larger southern association in his address before the meeting. He suggested a number of possibilities for the new group, including the establishment of regional laboratories for the investigation of methods of analysis and the properties of foods, drugs, medical devices and cosmetics.

Food Workers Wage

First processors of food will be brought under the minimum wage provision of the Fair Labor Standards Act if a revision of the law approved by the Senate Labor Committee is enacted. The new minimum would be 75¢. an hour instead of 40¢.

The committee knocked section 13 (a) 10—the "area of production" exemption—out of the law. This will have the effect of bringing an estimated 100,000 workers engaged in the first processing of food under the minimum wage, but still leave them exempt from the 40-hr. week overtime provision.

(Industry News Continued)

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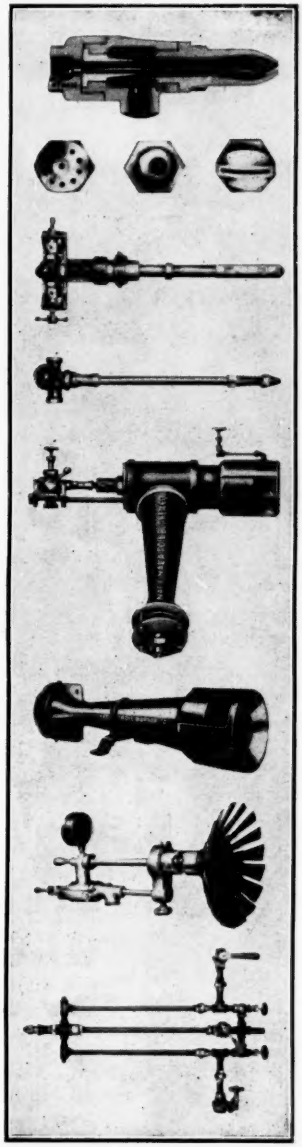

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British Combine

Stilts Still in Business

Anyone looking for a good excuse to get back to stilt walking may take a cue from these old timers in Kent, England, who are still clinging to a rather ancient method of tying lines for hops to grow on. But it's a job with a dim future, since machines and modern equipment are moving into the hop growing business, too.

PROCESSING

F&DA Issues Statements On MSG Policies

Three new declarations of policy concerning the use of monosodium glutamate, the flavoring salt, have been promulgated by the Food & Drug Administration.

In a recent notice to manufacturers, the administration announced that the salt could be used as an ingredient in foods for which standards of identity have not been established.

Those foods for which there is a standard of identity already established under section 401 of the Federal Food, Drug, & Cosmetic Act, cannot contain the new salt, however. Reason for this is that none of the standards so far set up provides for the inclusion of the salt as an optional ingredient. A request that this be done would move the administration to set hearings on the matter.

The policy declaration pointed out that if, in any case, the addition of the salt has the effect of concealing damage or inferiority, or of making the article "appear to be of better or greater value than it is," the article would be classed as adulterated regardless of labeling. The administration

recently relaxed the ruling that the salt be designated an artificial flavoring. It now can be used in most foods and meat products without causing the "artificial flavoring" label to be applied. It must be listed as an ingredient, however.

Meat Packers Discuss Bakery Emulsifiers

Factors affecting production costs, plant operations, product pricing, processing technics, merchandising, lard consumption and plant sanitation were the highlighted subjects of discussion at the 8th annual meeting of the National Independent Meat Packers Association, in Chicago in May.

The session on emulsifiers and their use in, and as replacement for, lard stimulated the most controversial interest. J. R. Frorer, General Manager, Industrial Chemicals Dept., Atlas Powder Co., Wilmington, Del., upheld the advantages of using the polyoxide type of anti-staling and emulsifying agent in foods containing fats, particularly bakery products, to extend their period of "freshness" and to obtain increased shortening effects of the fat used. Plea was made for incorporation of 15 to 20 percent of polyoxyethylene stearate into lard for both industrial and domestic uses.

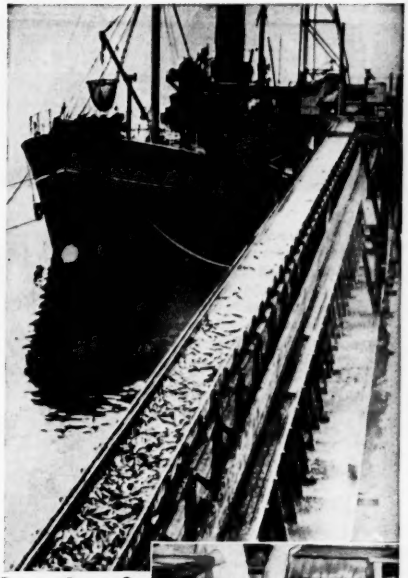
Effect on anti-staling of bread was claimed to be same as monoglyceride shortening but to a greater degree. Bakers were reported to have used 10,000,000 lb. of the polyoxide type of emulsifiers during 1947-48.

E. W. Brockenbrough, president, Institute of Shortening & Edible Oils, Washington, D. C., and John Pratt, counsel for the Institute, took the negative side of the debate and opposed the use of the emulsifiers. The basis of their argument was that replacement by these emulsifiers of part or all of the fat, oil and milk content of bakery products lowered the nutritive value of the products, undermined the market for lard and other shortenings, and presented a question of toxicity.

Statement was made that the domestic consumption of fats is annually in excess of 3,000,000,000 lb., whereas present annual production of lard is 2,000,000,000 lb. and that of shortening and oil 1,500,000,000 lb.—giving a reasonably well balanced fat economy. A threat to this economy is seen in the recommended formulas for bread containing emulsifiers, which would reduce the annual use of lard for bread shortenings from 360,000,000 lb. to less than 100,000,000 lb.

M. J. Thomas, Research Bakery Div., Swift & Co. Laboratories, Chi-

(Industry News Continued)



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cago, exhibited a number of loaves of bread containing 0.5 percent polyoxyethylene compounds but no shortening, an equal number of loaves containing 4 percent of lard based on weight of flour used, 12 cakes made with polyoxyethylene emulsifier but no shortening, and 12 cakes made with 12 percent hydrogenated shortening containing mono- and di-glycerides. Both groups seemed identical in external appearance as seen by the prospective purchaser but varied markedly in crumb texture, tenderness and palatability in favor of those containing the lard and shortening.

In cost, the difference was in favor of those containing the emulsifiers.

USDA Grade Standards

One of the regular activities of the USDA's Production & Marketing Administration has been the establishing and revising from time to time of grade standards for processed foods. And now that regular program is being supplemented and speeded up by additional funds appropriated under the Research & Marketing Act.

When Mr. E. A. Meyer, Administrator of the Research & Marketing Act, spoke to the United States Wholesale Grocers' Association in St. Louis on June 1, he discussed a number of R&M projects which he considered representative of the types of work being done under that Act. Part of his statement follows:

"One rather comprehensive project, for example, has to do with the development of new and revised standards for grades of processed fruits and vegetables. . . . Grades for green and wax beans, fruit jam and preserves, and cucumber pickles have been revised and officially published. Data have been obtained for new standards for grades of canned field peas, blackeye peas, and white potatoes. The necessary basic information has been collected for revising the standards for maple syrup, canned asparagus, blueberries, red sour pitted cherries, okra, spinach, and certain items of frozen produce. Honey, canned plums, pineapple, pineapple juice, apple juice, grape juice, and carrots are other items on which data are being collected with a view to revising the grade standards.

"Another project relating to grades of processed goods is directed at determining the yields and relationships of various grades of processed fruits and vegetables from specified grades of the raw materials. The first work under this study is to determine the grade and quantity of canned peas, tomatoes, tomato juice, and tomato

pulp that can be processed from given quantities and grades of raw products."

Among the recent grade standards issued by PMA are frozen cherries, canned cherries, frozen concentrated orange juice, canned grapefruit juice, canned orange juice, canned blended grapefruit juice and orange juice, and canned tangerine juice. Also of possible interest in connection with grade standards activities of the Department of Agriculture are revised requirements for plants operating under continuous inspection on a contract basis. Grade standards for unshelled pecans and for fresh spinach leaves have also been revised.

Frozen red sour (tart) pitted cherries have been covered by the second issue of U. S. grade standards, published on page 3297 of the June 18 *Federal Register* and effective immediately.

Canned red sour (tart) pitted cherries are now covered by the fifth issue of U. S. grade standards, published on page 3389 of the June 23 *Federal Register*, and effective upon publication. The fourth issue of these standards, now superseded, had been effective since July 1941.

Frozen concentrated orange juice is now covered for the first time by U. S. grade standards. These were published on page 3429 of the June 24 *Federal Register* with the 24th of July set as the effective date. It was pointed out in establishing these standards that there are other types of frozen concentrated orange juice than the one covered by this new standard. How-

(Industry News Continued)

Wide World

Must Be Summer

It doesn't seem to matter to this Atlanta, Ga., miss that the watermelons are from Florida. Farmers of Florida and South Georgia are looking toward a payoff crop, so who gets thar fustess is of little moment.

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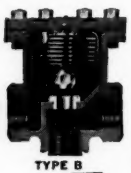

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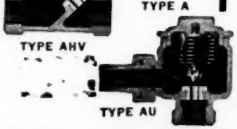

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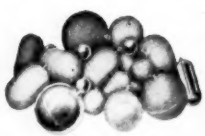

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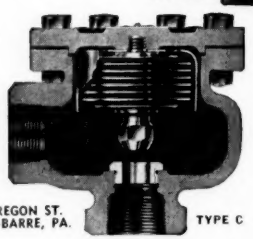

TYPE C

W. H. NICHOLSON & CO. 193 OREGON ST. WILKES-BARRE, PA.

ever, sufficient data have not been submitted to justify making provisions for the addition of sugar or incorporating requirements for other types of frozen concentrated orange juice at this time. The Department "will consider making further studies of such other types with a view of developing standards for them if a need is definitely established by the industry concerned, including the interests of consumers."

Canned grapefruit juice, canned orange juice, canned blended grapefruit juice and orange juice, and *canned tangerine juice* are now covered by revised grade standards. These were all published in the June 28 *Federal Register* beginning on page 3485, as forecast recently (see FOOD INDUSTRIES, June, page 117).

Requirements for plants operating under continuous inspection on a contract basis are set forth by PMA in considerable detail beginning on page 3575 of the June 30 *Federal Register.* Specifically discussed are the premises, buildings and structures, facilities, equipment, operations and operating procedures, and personnel of these plants. July 30 was set for the effective date of these requirements.

Regulations have been amended in connection with grading of butter, cheese, eggs, poultry, and domestic rabbits. These amendments, appearing on page 3432 of the June 24 *Federal Register,* deal largely with administrative details and fees.

Unshelled pecans are covered by standards revising the 1943 standards. These are published on page 2543 of the May 13 *Federal Register.*

Fresh spinach leaves are covered by revised U. S. consumer standards, superseding the 1948 issue. "U. S. Grade A", "U. S. Grade B", and "Off-Grade" spinach leaves are established. The revision was effective on publication so that it "may be used as a basis for packing and selling the current crop of spinach."

Short High-Temp Blanch Halts Loss in Peas

More nutritious canned peas may result from studies on vitamin C losses during processing made by food scientists at the Experiment Station, at Geneva, N. Y.

These investigations are part of an over-all research program seeking to improve the nutritive value of canned foods, which are assuming an increasingly important place in the nation's diet. Begun at the request of the food processing industry, the studies with peas have had to do with the effect of blanching on the vitamin C content of the finished product.

Since the necessary blanching destroys some of the vitamin C, the problem confronting the food scientists was to find the blanching temperature and length of time that will best accomplish the objectives of the operation and at the same time conserve as much of the vitamin C and mineral content of the peas as possible.

Considering blanching only from the standpoint of conserving the vitamin C of the fresh peas, the tests showed that a short, high-temperature blanch will yield more nutritious peas.

Millers Set Meeting

The 1950 meeting of the Association of Operative Millers will be held at the Hotel Jefferson, St. Louis, Mo., possibly the first week in May.

Officers for 1949-50 are: President, O. J. Zimmerman, Assistant Director of Manufacture, General Mills, Inc., Minneapolis; Vice-President, L. E. Collier, Arrow Mills, Inc., Houston, Tex.; Treasurer, re-elected for 16th term, H. H. Trapp, Russell-Miller Milling Co., Minneapolis; and Secretary, reappointed by Executive Committee, Donald S. Eber, Kansas City, Mo.

DISTRIBUTION

Brannan Plan Trial Run Viewed As Gamble

Democrats and Republicans in Congress are going to make a political gamble on the Brannan agriculture support program by agreeing to let Secretary Brannan make a "trial run" of his direct-payment program. Democrats supporting Brannan are confident that the trial run—on hogs and probably on wool and potatoes—will prove the new plan is workable and inexpensive. Republicans figure that by election time next year the program will be proved a flop and a costly venture.

The outcome will largely determine whether the Hope-Aiken law will be scrapped or not.

It is fairly certain that before Congress goes home the Hope-Aiken Law, voted by the GOP 80th Congress, will be amended to handle the trial run. The only question is whether the new price support formula will be a new 100 percent guarantee under a brand new parity formula; or whether the Aiken sliding scale of 60-90 percent of parity guarantee merely will be adjusted.

The two schemes—one from the

(Industry News Continued)

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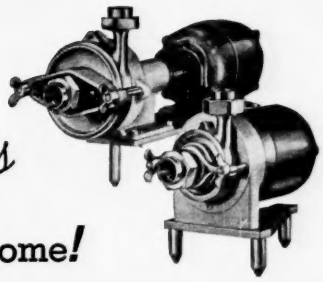
Meet all requirements
and then some!



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Peak performance is the prime purpose of these precision-built centrifugal pumps . . . outstandingly efficient units for food processors. Moving syrups—or other semi-liquids—becomes a cinch because of the three-bladed single piece impeller that won't cause churning or foaming. Beautifully designed, completely sanitary, easy to take apart and clean-up. Ask for interesting Nofome and Streamflo Pump Bulletin 9C.

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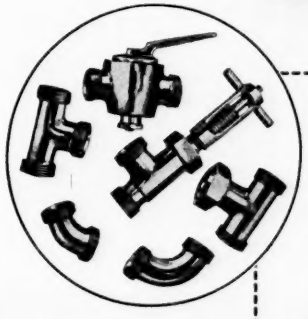

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SEALED-PIN, RUBBER-FLIGHT CHAIN CONVEYORS

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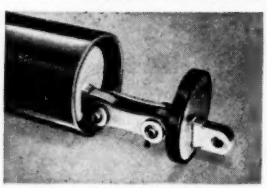
You can handle any type of *FLOWABLE* material at low cost per cubic foot with HAPMAN Conveyors. They have operated successfully for years and their versatility has been proven in handling all kinds of loose products from ground coffee and diatomaceous earth to crushed fish and ammonium sulphate.

If you now convey, elevate or otherwise move *FLOWABLE* materials, you should have our catalog on hand.



Each flight of this sealed-pin, solid link, conveyor chain consists of a layer of abrasive resisting rubber, bonded between 2 steel plates giving a rigid sanitary surface.

HAPMAN CONVEYORS, Inc. 2405 W. McNichols Rd. Detroit 21, Michigan

Another Coffee Roaster

Boston food shoppers were treated to this latest version of "on the premises" coffee roasters, which does the job at the rate of 1 lb. per min. by just pushing a button.

House, the other from the Senate—are these:

House: The Pace Bill would permit Brannan to make a trial run on three crops—crops that cannot be stored, plus milk and dairy products. The latter are prohibited specifically. The Pace Bill would establish a new parity formula replacing the old 1909-14 base, and supporting prices at 100 percent of the new parity formula. However, as it would work out, the support price itself would be just a bit above the present 90 percent guarantee, because the modernized parity formula tends to lower the parity price of crops.

Direct payments would be made to growers of "trial run" crops if the growers went under acreage limitation controls.

The Pace Bill has approval of the House Agriculture Committee, and has strong backing from House leaders.

Senate: Democratic Leader Lucas and Sen. Anderson, former Secretary of Agriculture, are behind a plan to run a trial on direct payments to hog producers this fall, extend the experiment to, say, wool and potatoes next year.

Production controls would be used, but rather than establishing a new parity formula, the senators want to modify the Hope-Aiken guarantee schedules. The 60 percent guarantee would be raised to 75 percent of parity, and the top guarantee would be fixed at 90 percent of parity. The way it would work is this: A farmer going

under crop controls would be guaranteed 90 percent of parity for another year; otherwise, his guarantee would not fall below 75 percent.

No matter which plan is finally voted by Congress, this much is certain: The government will be back in the business of crop control next year, at least on cotton and wheat, and on any other crops that are subjected to a Brannan-Plan trial run.

Industrial Sugar Users Urge Cuban Increase

Every summer, the nation's industrial sugar users make a pilgrimage to Washington. Their object: To persuade the Secretary of Agriculture to let more Cuban sugar into the U. S.

This year, the sugar users came a little earlier and talked a little faster. With the ice cream and canning seasons coming on, and peak production in the offing, they are finding supplies running low.

The shortage is putting pressure on prices. While the cost of most other foods has been declining since last year, sugar has been edging up. Last summer the wholesale price was something like 7.5¢ per lb. These days it is touching 8¢—and it will probably go higher.

Here are the reasons for the squeeze: (1) Secretary Brannan, acting under authority granted him by the Sugar Act of 1948, fixed a national consumption quota (7,250,000 tons) that appears to be too low. That means that even if all sugar-growing areas fill their production quotas, there still will not be enough sugar available in the U. S. to meet demand at moderate prices.

(2) Some producing areas cannot meet their quotas—the Philippines, for example, also Hawaii, where the stevedore strike halted shipments.

(3) Brannan has moved slowly in re-assigning the quota deficits to the two surplus areas—Puerto Rico and especially Cuba—that could make up the deficiency.

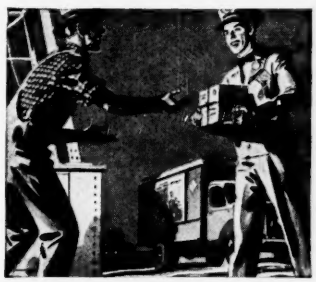
Brannan, of course, has to move slowly. He has to manipulate the quotas so as to leave domestic beet and cane growers all the market they can handle. And if he lifts the lid on Cuban imports too fast or too far, he can cause an embarrassing glut.

Brannan, however, has come a long way around to the industrial users' way of thinking. He has already reassigned a total of 625,000 tons to Cuba and Puerto Rico. That leaves, according to informed but unofficial estimates, about 100,000 to 150,000 tons still to be reallocated when local situations become clearer.

(Industry News Continued)

$3.19 Air Express cost helped this wildcatter strike it rich!

When a pump valve goes while drilling for oil, it's costly. Idle men and equipment make profits evaporate. It happened to a wildcatter at 4 P.M. Phoned 800 miles away for parts—delivered 11 P.M. that night by Air Express. 12 lbs. cost only **$3.19.** (*Regular* use of Air Express keeps *any* business moving.)



$3.19 was *complete* cost. Air Express charges include speedy pick-up and delivery service. Receipt for shipment, too. Makes the *world's fastest* shipping service exceptionally convenient.

Air Express goes on all Scheduled Airline flights. Frequent schedules—coast-to-coast overnight deliveries. Direct by air to 1300 cities, fastest air-rail to 22,000 off-airline offices.

Facts on low Air Express rates

Special dies (28 lbs.) go 500 miles for $4.30.
6-lb. carton of vacuum tubes goes 900 miles for $2.10.
(*Same day* delivery if you ship early.)

Only Air Express gives you all these advantages: Special pick-up and delivery at no extra cost. You get a receipt for every shipment and delivery is proved by signature of consignee. One-carrier responsibility. Assured protection, too—valuation coverage up to $50 without extra charge. Practically no limitation on size or weight. For fast shipping action, phone Air Express Division, Railway Express Agency. And specify "Air Express delivery" on orders.

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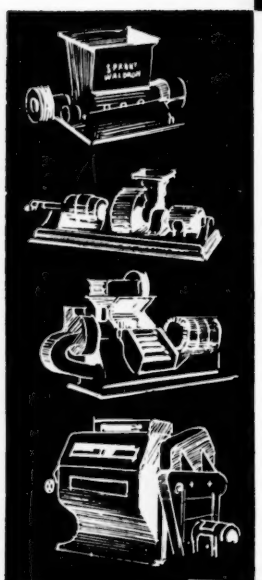
Rates include pick-up and delivery door to door in all principal towns and cities

AIR EXPRESS, A SERVICE OF RAILWAY EXPRESS AGENCY AND THE
SCHEDULED AIRLINES OF THE U.S.

Is yours a problem of
SIZE
REDUCTION?



GRANULATING, pulverizing, defiberizing, crushing, or cutting—whatever you call it, **if it's size reduction,** Sprout-Waldron can help you.

Reduction of cocoa cake . . . corn for meal or distillers' grits . . . wheat for flour . . . citrus waste for feed—these are typical applications in which Sprout-Waldron experience and equipment have been outstanding.

Every day S-W Engineers are transforming new and varied size reduction problems into more profitable operations. Whether your processing calls for the usual or the unusual approach, first learn what Sprout-Waldron can do for you!

Outline your size reduction problem today! Contact Sprout, Waldron & Co., 35 Waldron St., Muncy, Pa.

SPROUT WALDRON
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MUNCY PENNSYLVANIA

69A

Food Industry News

But these reallocations will not halt a wholesale price rise, expected some time in July. Why? For one reason, no Hawaiian sugar has been reaching the West Coast for many weeks now. This has forced western sugar users to bid for supplies that normally come from Cuba and other Caribbean sources.

Another reason: Raw sugar prices have been inching upward for the past year or so.

Schedule of Events

August

8-11—International Apple Assn., 55th annual convention; Hotel Sherman, Chicago.

9-12—Western Packaging Exposition, 2nd annual conference and exposition on packaging, packing and shipping; Civic Auditorium, San Francisco.

15-19—International Dairy Federation and Swedish Dairy Industry, 12th International Dairy Congress; House of Parliament and Concert Hall, Stockholm, Sweden.

15-19—American Oil Chemists Society-University of Illinois edible fats and oils short course; Urbana, Ill.

17-Sept. 6—United Nations, scientific conference on conservation and utilization of resources. Aug. 18: Critical food shortages. Sept. 2: Development of fish resources and processing. Lake Success, New York.

28-31—National Frozen Food Locker Assn., 10th annual meeting; Stevens Hotel, Chicago.

September

8-9—Cornell University, dairy industry conference; Ithaca, New York.

October

9-12—Master Brewers Assn. of America, annual convention; Los Angeles.

15-20—American Bakers Assn., annual convention and baking industry exposition; Municipal Auditorium, Atlantic City.

20-22—International Assn. of Milk & Food Sanitarians, 36th annual convention; Deschler-Wallick Hotel, Columbus, Ohio.

24-26—Packaging Institute, 11th annual forum; Commodore Hotel, New York City.

24-26—National Assn. of Popcorn Mfrs., international convention and exposition, Palmer House, Chicago.

24-28—National Safety Council, 37th national congress; Stevens, Congress, and Morrison Hotels, Chicago.

26-28—Milk Industries Foundation, annual convention; Ambassador Hotel, Los Angeles.

26-28—International Assn. of Ice Cream Mfrs., 45th annual convention, Biltmore Hotel, Los Angeles.

28—National Pickle Packers Assn., annual meeting; Sheraton Hotel, Chicago.

31-Nov. 2—American Oil Chemists Society, fall meeting; Edgewater Beach Hotel, Chicago.

31-Nov. 3—Supermarket Institute, mid-year meeting; Hotel Cavalier, Virginia Beach, Va. —*End*

They Do It With People
—why not with Paints?

The Past-Performance Test

No one ever hires a person without applying the "Past-Performance" test. "What have you done?" . . . "What is your background . . . your education?" . . . "What are your qualifications?" . . . "Where have you worked before?" This, indeed, is good business.

The Say "Ah" Test

Some businessmen have found it wise to use a thorough physical check up to determine the health of prospective workers.

The Square-Peg-in-the-Round-Hole Test

Newer, and of growing significance, is the aptitude test. Not content with past-performance and health tests, businessmen find that scientifically planned aptitude tests are most helpful in finding the *right* man for the *right* job.

The Round-Can-on-the-Square-Wall Test

How many square feet of solid coverage can you get from a round can of paint?

Let's not guess. It is better to test.

Paints, like people, differ greatly. A gallon of one paint will cover more square feet than a gallon of another. Some paints go on faster and easier. Some look better and last longer. So test, brother, test.

Take a gallon of Barreled Sunlight, thin properly, and put it on a wall. See how much it covers . . . how *well* it covers. Check how fast it goes on. Notice how white and clean it looks after drying. *Then*, do the same with a gallon of any other good paint. Compare the results . . . in terms of coverage, appearance and painting time. You'll see how true it is that Barreled Sunlight will give you a better-looking, longer-lasting interior paint job *for less money* than any other paint.

Let's talk it over. Write and our representative will call.

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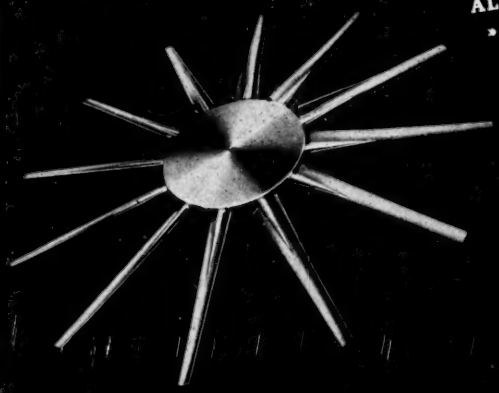
37-H Dudley St., Providence, R. I.

Barreled Sunlight *Paints*

In whitest white or clean, clear, pleasing colors, there's a Barreled Sunlight Paint for every job

NEW Marley FANS
For Cooling Towers and DriCooler*
Do The Job Better . . . Longer



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- Multibladed
- Balanced
- Unusually quiet and smooth operation
- High tensile cast aluminum alloy
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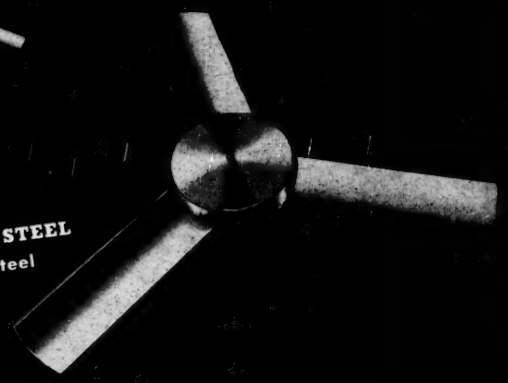

STAINLESS STEEL
- All stainless steel
- Adjustable pitch
- Balanced
- Air foil section
- Quiet and smooth operation

FAN CYLINDER
- Unusually rugged
- All bolted
- Flared throat
- Non-corrosive

Marley Fans and Fan Cylinders team up to do the job better . . . longer! These fans are designed and manufactured by The Marley Company especially and exclusively for water cooling applications.

Your new MARLEY Water Cooling Tower or "DriCooler"* will have this equipment, but you can improve your present water cooling tower, right now, regardless of size or make with these new MARLEY FANS.

*DriCooler is the exclusive trade-mark of The Marley Company, Inc., and designates its finned tube dry surface cooling equipment.

MARLEY

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Changes in Food Supplies

Production

CREAMERY BUTTER production in May, was at the highest level for the month since 1945. Estimated at 159,780,000 lb., output was 20 percent higher than in May 1948, and 29 percent higher than in April. The April-May increase, however, compares with 33 percent last year and 28 percent for the 1943-47 average.

ICE CREAM output in May was estimated at 55,770,000 gal., 3 percent larger than a year earlier and 9 percent higher than the five-year average. The April-May increase was 24 percent, compared with 8 percent last year and the five-year average of 19 percent.

SHERBET production of 1,430,000 gal., in May, was 51 percent higher than the May 1948 output, but was 65 percent under the five-year average for the month. The April-May increase was 35 percent, compared with an increase of 19 percent a year ago and a five-year average gain of only 13 percent.

AMERICAN CHEESE output reached 116,670,000 lb. in May, which was second only to May 1942. Production was 14 percent above May 1948 and 16 percent above the five-year May average. The April-May gain was 32 percent, compared with a 39 percent gain last year.

Materials

SWEET CORN acreage for canning and freezing amounts to about 5 percent less than last year. The total of 469,000 acres compares with 493,700 acres planted last year, and a ten-year average of 462,290 acres.

CHICKS produced in commercial hatcheries during May came to 30 percent more than were produced in May 1948, and were 5 percent above the 1943-47 May average. Production totaled 275,208,000 chicks.

SPRING PIG crop totaled 59,040,000 head, an increase of 15 percent over last spring. The combined spring and fall crop is now expected to reach 96,000,000 head, which would be 13 percent above 1948 and 8 percent above the 1938-47 average.

GREEN PEA production for canning and freezing will be about 3 percent under the 1948 crop, and 11 percent under the 1938-47 average, according to mid-June estimates. Plantings and yields at that time indicated a harvest of 341,670 tons, which compares with 353,960 tons in 1948 and 382,920 tons for the ten-year average.

FRUIT AND VEGETABLE STOCKS* in canners' hands this June 1 as compared with the previous year (compilation by National Canners' Assn.).

	Cases June 1 1949	Cases June 1 1948
Apricots	1,522,000	706,000
Sweet cherries	65,000	23,000
Peaches, clings & frees	3,518,000	1,877,000
Pears	788,000	793,000
Beans, green & wax	601,000	631,000
Tomatoes	4,363,000	3,335,000
Tomato juice	9,016,000	5,721,000
Peas, Alaskas & sweets	4,691,000	7,598,000

* Fruits on 24/2½'s basis, Vegetables on 24/2's basis.

Storage

FROZEN FISH AND SHELLFISH held in storage June 1 totaled 92,060,277 lb., compared with 85,600,671 lb. held June 1, 1948.

FREEZER OCCUPANCY declined during May, for the first time in that month on record, falling 1 point between May 1 and June 1. Occupancy normally rises from 2 to 3 points during May.

COOLER OCCUPANCY remained at 49 percent on June 1, the same as on May 1. As with freezer space, cooler occupancy was abnormally low for this period.

Indexes

The commodity index for foods, compiled by the New York *Journal of Commerce*, was at 181.4 for the week ending July 9. A week earlier it was 180.0; for May, 185.6; and for July 1948, 210.2.

Business Week's index of business activity stood at 180.5 for the week ending July 9, which compares with 177.4 for the previous week, 185.8 a month earlier, and 194.4 a year earlier.

CONSTRUCTION

	Pending (thousands)	Total Awarded July (thousands)	Total Awarded 1949 (thousands)
Bakery	$138	$225	$3,403
Beverages	393	100	10,428
Canning and Preserving	.....	.....	115
Cold Storage	.....	.....	1,813
Confectionery	.....	240	1,008
Grain Mill Products	2,050	230	16,538
Ice, Manufactured	.....	.....	.....
Meats and Meat Products	.....	.....	7,157
Milk Products	238	74	2,535
Miscellaneous	2,858	188	10,174
	$5,677	$1,057	$53,171

THE FLEISCHMANN LABORATORIES
Research Headquarters For Natural Yeast Products

Baby Food Hits Jackpot!

A LEADING processor reports his fortified baby food an instant success. One low-cost nutritional fortifier pepped up product... sparked advertising and sales.

Get the facts! Follow the trend to fortified foods. One of our technical men will be pleased to consult with you. No obligation! Special Products Division, STANDARD BRANDS INCORPORATED, New York 22, N. Y.

VITAMIN D PRODUCTS: Hy-Dee Irradiated Dry Yeast, Irradiated Dry Yeast Type 700-H; Viosterol (Irradiated Ergosterol).

NATURAL B-COMPLEX PRODUCTS: Pure Primary Dry Yeast (brewers' type), Bee-Flex Products, Yeast Extracts, Yeast Extract and Liver, Fortified Yeast with Iron.

MALT EXTRACTS AND SYRUPS: A complete line of dry and liquid diastatic and non-diastatic malt extracts and malt syrups.

Fleischmann's
"First For Food Fortification"

CASE HISTORY #3

The.....Co., nationally known food manufacturers, phoned Edlaw: Have Export Order for one million Cans Soup Mix—Deadline shipping date—Hot weather stopped our packaging line!

Have you air-conditioned plant? High speed filling equipment? Automatic can closing? Labeling machine? Can you take over this order and deliver on time? Will costs be in line?

All questions answered "yes"! Bulk material and supplies were started in — and finished cases were rolling out —on schedule— as promised!

Memo to Contact The Edlaw Co.—

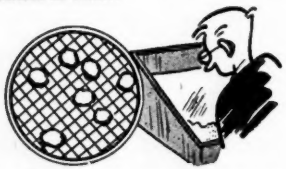
Contract Packaging
AT PRE-DETERMINED COST
88-61 76th AVENUE
GLENDALE, L. I., N. Y.

HOW TO SEPARATE A CAT FROM A MOUSE

● Simply a matter of screening . . . a useful trick for a mouse to know. In fact, screening is a useful trick in any trade. . . . even the salt business!

You see, in the salt business we've got to fit the salt to the job. Butter-makers don't want large, slow-dissolving crystals in Butter Salt. We remove the "big ones" so completely, you won't find even a trace on a 28-mesh Tylor screen. But they don't want fine dust, either, to cause pasting in the churn. Diamond Crystal Butter Salt contains only 3% of particles small enough to pass through a 65-mesh screen!

Yes, it's as vital to the butter-maker that we remove over-sized and under-sized salt crystals . . . as it is to the mouse to screen out that cat. (Well, *almost* as vital!)



Happily for the mouse, he got results. And so do we at Diamond Crystal. That's why you can always be sure of clean screening whenever you specify Diamond Crystal. Take your choice of grade or grain size — it's tops by actual tests!

Want Free Information on Salt? Write Us!

If *you* have a salt problem, let our Technical Director help! Just drop him a line in care of Diamond Crystal Salt, Dept. **J-11**, St. Clair, Michigan.

DIAMOND CRYSTAL
ALBERGER PROCESS SALT

What Washington Thinks

By R. S. McBride, Washington, D. C.

WHO HAULS IT?—Raw materials for the food industries constitute a large part of the total tonnage of the agricultural products that leave the farm. Forty-five percent starts out in a farm-owned vehicle; 33 percent goes in a hired truck; 22 percent in the buyer's truck. The government figures show also that the buyer's equipment is used principally in poultry and egg haulage, whereas the farmer's vehicle is most important for grain, fruit, and vegetables. Only in the case of livestock and milk are for-hire trucks a dominant factor.

OUR RESPONSIBILITY—"The responsibility for development of treatment methods for industrial wastes rests primarily with industry." This is an official statement of the Public Health Service, the agency that will handle the sanitary engineering problems involved in prevention of stream pollution. It is also important to note that these authorities are fully expecting a discontinuance of discharge of untreated organic matter from industrial plants into the public waterways. Cooperation in elimination of such effluent is promised definitely, and very sincerely, by the government. And the government is not going to wink at continuing preventable pollution. It is obviously none too soon to begin a survey of every present effluent that might cause official criticism.

LESS COMPETITION—The post exchanges of the Military Establishment have been under heavy fire for unfair competition with taxpaying enterprise. Sensing the seriousness of the criticism, the military managers are agreeing to eliminate the several million dollars' burden on taxpayers that has made the goods at the PX more favorably priced than in nearby stores. However, some advantages for the customers in uniform will remain. Merchants still feeling this competition will have a chance again next year to ask for further relief. This privilege is, of course, open to those food manufacturers who would like to speak a word for more equitable competitive conditions at the retail level.

NEW TAX BASE—Old age and retirement features of Social Security will shortly compel Congress to "up" both employees and employers 1 percent of payrolls. Everybody has heard about that, and those opposed are making their voices heard rather effectively in Congress. The legislators are reluctant to have the rate increased any sooner than necesssary.

Far less attention is being given to a much larger threat to the salaried workers' "take-home." Quite seriously under study is the idea of applying increased percentages to a higher total sum. One proposal which gets some attention proposes a 3 percent tax on both employee and employer up to a total of $4,800. Thus, the present maximum of $30 a year (1 percent on $3,000) might become even as much as $144 per year (3 percent on $4,800). More attention to this tax base question ought to be paid by professional salaried folks. A five-fold jump would certainly be painful to many people.

QUEER FIGURES—The Department of Commerce has been the subject of criticism for its recent index of sales by chain stores and mail order houses. Chamber of Commerce of United States wants to know why there are increases in index of sales when actual sales go down, and vice versa. The department admits that the figures are subject to "shifting seasonal adjustment." We wonder if we can't find out from the department how to make increased buying power for food manufacturing companies out of decreased gross sales. Such advice from the Commerce Department would really be something!

PIG-PRICE TEST—Secretary of Agriculture Brannan proposed some months ago a comprehensive new program of farm aid. In essence, it was a guaranteed income for farmers rather than a guaranteed market price. Apparently realizing that Congress would not give him this full authority this year, the proposal was narrowed down considerably. The idea became a proposal that this new technic of farm support be experimentally tested on pig prices. But it is evidently going to be as hard as ever for papas with limited paychecks to "bring home the bacon."

NEW HAZARD—One housewife recently outdid all previous attempts in proving that DDT does not make good food. This lady dipped the chicken before frying in DDT powder, apparently as a substitute for flour. The family and its pet dog required brief hospital treatment. The next thing Washington expects is that Congress will loudly debate for a week or

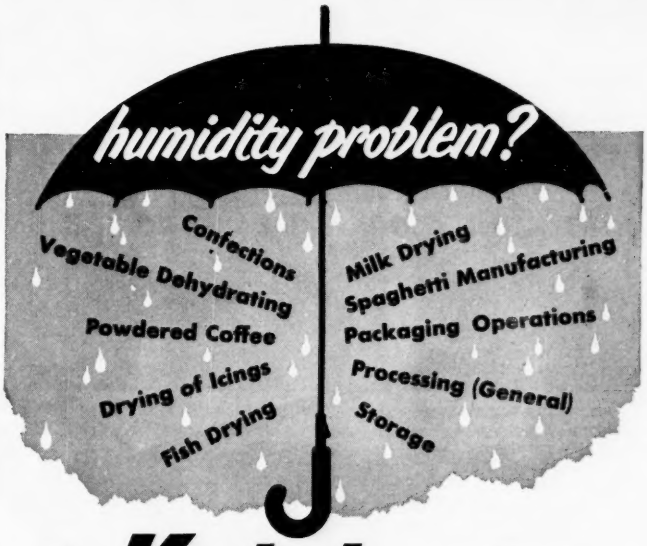
two some legislation forbidding the dipping of Southern fried chicken in DDT powder. Surely, "there should be a law."

R&MA FOR POINT IV—Foreign Trade Advisory Committee assisting in plans for Research & Marketing Act funds has recommended increased attention to the furnishing of agricultural commodity specialists in about 50 foreign countries. Objective is to stimulate further foreign demand for U. S. farm products. We wonder whether such a group, if it functions as hoped, will successfully compete with the opposing section that is going to show farm producers of the rest of the world how to grow more crops per acre, how to get more butterfat per cow, and all of the rest of the things that will help them as producers. In any event, Uncle Sam is spending to create new competition on one hand, and to dispose of our surpluses on the other. Secretary Brannan directs both of the competing teams.

THE FARMERS' SHARE—Official Washington weeps that the farmers' share of the consumer food dollar dropped during May to 49c. The peak in 1948 was 53c. A study of earlier records show that the farmer was rather comfortable from 1935 to 1939, when he got only 40c. of the market-basket dollar. We feel sure that the Congressional plans will not tolerate a return to such a "normal." Why do we feel sure? Well, farmers still vote!

RESEARCH SPREADS—In prewar days, industry paid about 70 percent of the research bill, with the balance coming about equally from government and other non-industrial sources. Present research money originates quite differently, according to the Department of Commerce. Industry provides barely 40 percent, government about 54 percent, others about 7 percent. The total sum is so much greater that the actual dollars spent by industry and by "others" is probably as much as before the war. Government is the one that has upped its research spending many-fold.

These facts largely influence programming of research by technical executives of the food business. It is now necessary to figure whether a company by reasonable spending can hope to get answers for its exclusive use, or whether government may reduce the value of industry spending because of its mass influence on programs. Thus far, this factor has, very fortunately for the public, not yet discouraged industrial support of new investigations.



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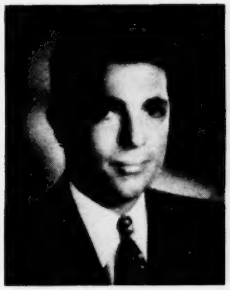
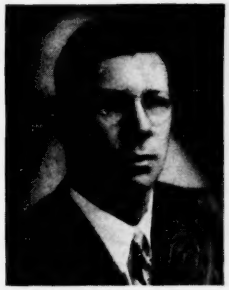
Men, Jobs, Companies

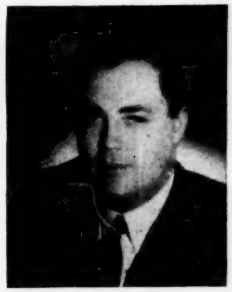
RAYMOND J. WISE, newly elected director of National Dairy Products Corp., is also president of Sheffield Farms Co., New York City. He was formerly supervisor of corporation's midwest milk and ice cream operations.



DAVID M. LEVITT has been named head of Doughnut Corp. of America, succeeding his father, founder of firm. A graduate of Yale and American Institute of Baking, Mr. Levitt has been with company for 11 yr.



A. W. DUTCHER has joined staff of National Assn. of Frozen Food Packers, Wash., D. C. A Pennsylvania State College graduate, he formerly headed manufacturing division of Chef-Boy-Ar-Dee Quality Foods, Milton, Pa.



GEORGE R. FREDERICK is new president of Loft Candy Corp., succeeding the late M. W. Wirzel. Formerly head of Herz Candy Co., St. Louis, and recently a partner of Russel Stover chain. Frederick joined Loft in '41.

Industry

American Association of Candy Technologists, at its first annual meeting in Chicago, elected the following officers: President, S. O. Schnitzer of Leaf Brands, Inc., Chicago; 1st vice-president, Velt Stafford, St. Louis; 2nd vice-president, R. G. Haley of Brown & Haley, Tacoma, Wash.; and sec.-treas. H. F. Dresel of Felton Chemical Co., Philadelphia.

Argun Corp. is the name of company formed by E. K. Arakelian and Vas Gunner of Fresno, Calif. who purchased the 5,000,000-gal.-capacity Petri Wine plant at Tulare, Calif.

Biscuit & Cracker Manufacturers Association's new officers are: President, E. F. Chambless of Schulze & Burche Biscuit Co., Chicago; vice-president, A. P. Strietmann of Strietmann Biscuit Co., Cincinnati; vice-president, Hanford Main of Sunshine Biscuits Co., Inc., Long Island City, N. Y.; and vice-president, G. H. Coppers, National Biscuit Co., New York City.

Borden Co., Ltd., has received contractors' tenders for new milk drying and cream separating plant at Kemptville, Ont., Canada. Plans call for a one-story, steel, tile and brick construction of 21,000 sq. ft., plus a 40-ft. "tower" powdering room.

Gibson Ice Cream Co., High Point, N. C., has become affiliated with The Borden Co. and will operate as the Borden Gibson Div.

Colorado Milling & Elevator Co., Denver, has bought a flour mill, prepared cake and roll mix plant, grain storage elevator, and feed mill at Omaha, Neb.

Illinois Grain Terminal Co. has purchased, from Chicago Grain Corp., the 2,500,000-bu.-capacity Irondale terminal elevator in South Chicago. Reported price: $1,300,000.

Kist Canada Ltd., Stratford, Ont., formerly owned by Citrus Products Co. of Chicago, has been purchased by Canadian interests.

Kraft Food's new cheese plant in Clarksville, Tenn., recently held its first trial run. Capacity of plant will be 15,000 lb. daily.

National Breweries, Ltd., Montreal, announced appointment of C. H. Hanson as vice-president and assistant to the president.

New Castle Packing Co., New Castle, Pa., is building a $250,000 packing plant.

Osceola Foods, Inc., Osceola, Ark., has begun limited production of oleomargarine in its new $385,000 plant.

Pepperidge Farms recently opened its new $500,000 bakery in Norwalk, Conn. Plant is described as America's most modern bakery.

Plantation Cove Oyster Farms, Inc., Cape Charles, Va., has been formed to plant, propagate, cultivate and grow oysters and other seafood.

F. Ritter & Co. announced construction of an additional essential aromatics plant in Los Angeles to serve also as its world headquarters.

Seabrook Farms' brand of frozen foods will be distributed throughout the Southeast by Southern Dairies, Inc.

Sunshine Biscuits, Inc., reports that the new flour packaging plant under construction at its Grafton Mill, Elyria, Ohio, will be equipped with the most advanced machinery. Operation will begin in the fall.

Sunrise Products, Inc., cannery plant in Fort Pierce, Fla., has been purchased by Cherokee Products, Inc., of the same city.

C. A. Swanson & Sons, Omaha, Neb., has purchased the complete poultry processing plant in Salisbury, Md., formerly operated by Southern States Cooperative of Richmond, Va.

White Ice Cream & Milk Co., Wilmington, N. C., has taken over the plant and assets of Dixie Dairy Products Corp., Moorehead City, N. C.

Personnel

W. S. Antliff has been appointed general manager of Canada Bread Co., Ltd., Montreal, Canada.

W. J. Biehl, formerly with Libby, McNeill & Libby, and more recently vice-president of George Fry & As-

(*Men, Jobs, Companies Continued*)

FMC FLAT TOP STEELBELT

Made of No. 302 (18-8) stainless steel

We'll gladly send a sample of this all-purpose STEELBELT, used for conveying every kind of product. See for yourself how rugged it's made, how easy to splice, how flexible in operation, how easy to clean.

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SELF ACTING CONTROLS TEMPERATURE of LIQUIDS or AIR

Simple • Economical • Dependable

POWERS

THOMAS S. OLSEN, executive vice-president of General Baking Co., has been elected to company's board. Since joining firm in 1913, he has pioneered many advancements in the industry—most recent being pre-slicing of fruit cake into three layers.

sociates, Chicago, is now vice-president in charge of production and research for Comstock Canning Corp., Newark, N. Y.

H. R. Caldwell, formerly with Doughnut Corp. of America, New York City, has become manager of Omaha Flour Mills Div. of Colorado Milling & Elevator Co.

J. E. Daniels has joined Fireside Marshmallow Co., Chicago, as executive vice-president.

W. T. French has been appointed to research department of Curtis Publishing Co. to head the food, drug and toilet goods section.

H. R. Galbraith has been appointed product manager of all Pillsbury grocery products.

C. B. Heinemann of Washington, D. C., was re-elected president and secretary of National Independent Meat Packers Assn. at 8th annual convention held in Chicago.

A. Ludwig, since 1935 general manager of Superior Sugar Refining Co., Menominee, Mich., has retired from this post but will continue as vice-president and member of board.

R. B. Muller was appointed plant superintendent of new Durkee Famous Foods margarine plant in Macon, Ga.

M. McClelland has been named president of Chicago ice cream division of The Borden Co. to succeed R. C. Taylor, retired.

(Men, Jobs, Companies Continued)

"A first look can sell a product . . . but the FIRST TASTE MAY KILL IT"

Says
DR. L. V. BURTON
(Noted technical authority on foods and Executive Director of the Packaging Institute)

Leading authorities in the food field know the importance of product protection. Eye-appeal builds impulse sales, but repeat sales depend on whether your product pleases the buyer.

Check the sales leaders in field after field and you will find well-designed packages . . . and over and over again, you will find a Riegel paper inside for product protection. Many other Riegel papers are designed for flexible packages, for laminates, for outer wraps and for almost every requirement in protective packaging.

Tell us your needs, and we believe we can offer you a paper that will do *your* job . . . efficiently and economically.

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PAPERS that like Hard Work!

Legislative halls have resounded with stormy words about OLEO VS. BUTTER. We are neutral. We merely go about our business of making those superlative G&G* task papers which so perfectly package both of these good foods.

Meats being essentially fatty foods, how completely sensible to wrap them in genuine greaseproof parchment. It's so good for the meat — so safe for dainty sleeves and gloves — a gracious service which proclaims "Here's a good store".

Stack-O-Wheats and sausage (or bacon, if you prefer). Ummm.....good!! *And*, like as not all packaged by Rhinelander — cakes, too, expertly premixed, ready for you to fry to crisp, golden goodness in a matter of moments.

*Glassine and Greaseproof the functional papers that do so many tough jobs well.

IN THE LAND O' LAKES • RHINELANDER, WISCONSIN

Men, Jobs, Companies

Dr. J. N. Gowanloch, chief biologist of Louisiana Dept. of Wild Life & Fisheries, has been elected president of National Shellfisheries Assn.

H. H. Hannam, Ottawa, Canada, has been appointed president of International Federation of Agricultural Producers.

F. L. King, formerly sec.-treas. of Patent Cereals Co., Geneva, N. Y., has been elected president of the firm to succeed T. K. Fahy, who died June 1.

R. J. McGillis, Toronto, Canada, has been appointed president of Confectionery, Chocolate & Cocoa Industries of Canada.

J. D. North, vice-president of Foote, Cone & Belding advertising agency, has resigned to become general manager of Western Beet Sugar Producers, Inc., San Francisco.

B. H. Prentice, Jr., has been named assistant general manager of Kraft Foods Co. of Wisconsin, with headquarters in Green Bay.

C. J. Schneider, former executive of Detroit Creamery Co., has been elected president of St. Louis Dairy Co. to succeed B. M. Lide, resigned.

V. Stafford, formerly chief chemist with Chase Candy Co., St. Louis, has accepted a similar position with Nutrine Candy Co., Chicago.

Associated Industry

Allis-Chalmers Mfg. Co. has appointed J. D. Greensward general manager of the company's Norwood, Ohio, plant.

American Well Works, Aurora, Ill., has appointed G. A. Fleet as district manager of its New York office.

Carrier Corp. has appointed D. W. Hoppock product manager of commercial refrigeration.

Clark Equipment Co., Battle Creek, Mich., announces that its fork-lift trucks, tractors and handling attachments will be sold exclusively through a nation-wide franchised dealer organization.

Container Corp. of America announces that its wholly owned sub-

(*Men, Jobs, Companies Continued*)

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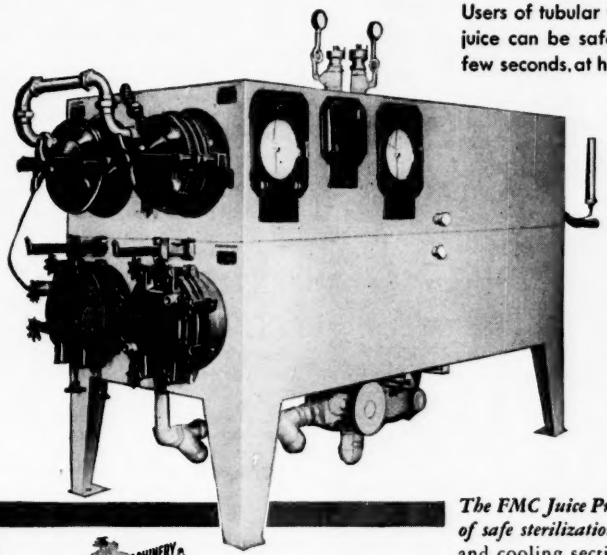
Users of tubular flash pasteurizers now know that tomato juice can be safely sterilized against spoilage, in just a few seconds, at high temperatures.



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4-Unit
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Includes:
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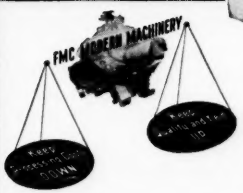
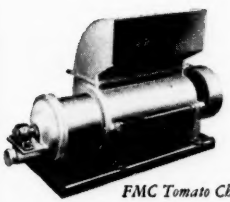


FMC Juice Extractor



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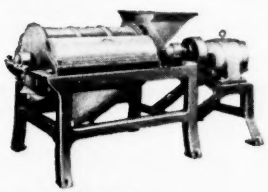
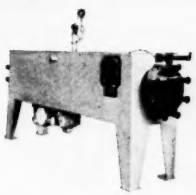
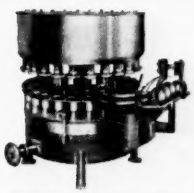


FMC Super Pulper



FMC Preheater



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J-500R

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INDUSTRIAL engineers say that material handling constitutes as much as 50% of total production cost—cut handling costs and you cut production costs. Order and cleanliness—freedom from congestion — increased safety — smooth flowing coordinated movement of material or packages — these are plus advantages from Standard Conveyors in addition to their time, money, and manpower economies.

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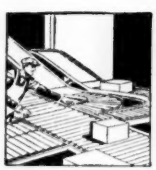

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sidiary, California Container Corp., has leased plant and equipment of Columbia Paper Box Co., Portland, Ore.

Fedco Container Co. of Akron, and **McCreary Can & Tube Co.** of Erie, Pa., will jointly open a plant near Sharon, Pa.

Mack Trucks, Inc., announces that E. D. Bransome has been elected president and chairman of board to succeed L. G. Bissell and C. T. Ruhf, who continue as board members.

Oakite Products, Inc., announces that D. C. Ball, founder of the firm and for a long time president, has been elected chairman of the board. J. A. Carter becomes president.

John Maher Printing Co., Chicago, has entered the printed label field with its Kittredge Label Div.

W. W. Reece Engineering Service has been formed in Chicago to act as a consulting agency for the baking industry.

Deaths

E. J. Bernard, 57, central division sales manager of Kraft Foods Co.—suddenly, at his home in Evanston, Ill., **June 1.**

H. F. Fetzer, 64, special representative for N. Y. general sales branch of Sylvania Division, American Viscose Corp.—suddenly, in Mount Kisco, N. Y., June 4.

M. J. Metzger, 78, director and vice-president of Bowman Dairy Co., Chicago—June 3.

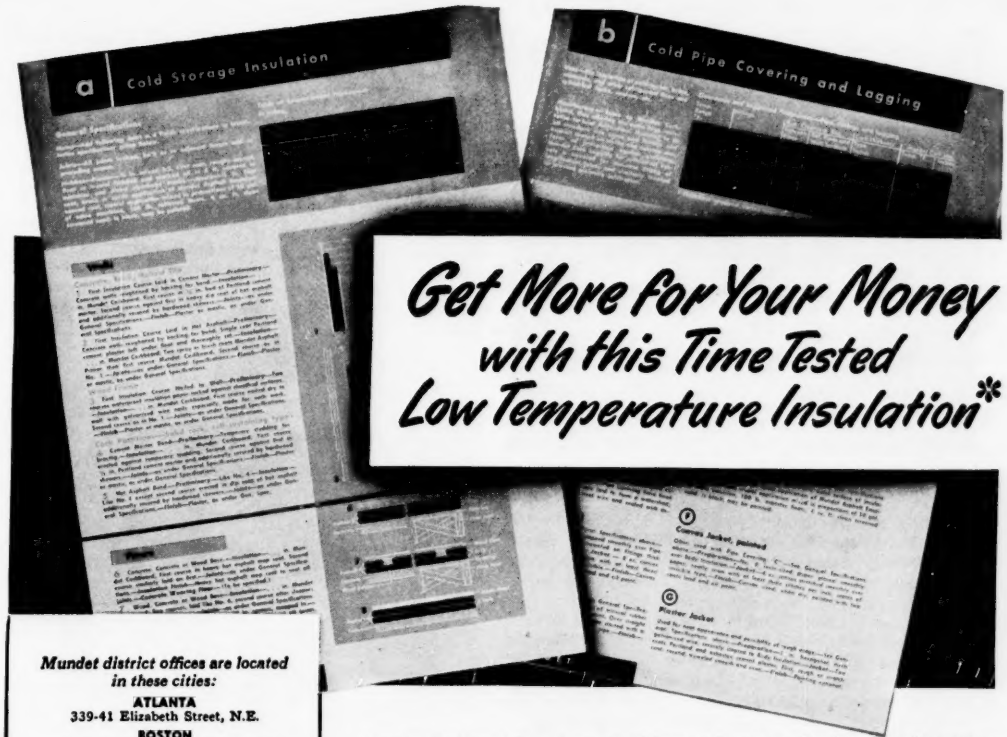
W. B. Olney, 46, co-founder of Olney & Carpenter, Inc., Wolcott, N. Y.—in Strong Memorial Hospital, Rochester, N. Y., June 14.

R. L. Pollitt, 48, manager of Beatrice Foods milk plant in Danville, Ill., and president of Central Illinois Dairy Technology Society—May 22.

W. G. Rea, 72, president of Rea & Page Milling Co., Marshall, Mo.—June 1.

O. A. Sjostrom, 81, for 34 yr. research chemist with Corn Products Refining Co. and former president Chicago Chemists Club—at his home, **June 16.**

—*End*



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Mundet Corkboard is a time-proved heat and moisture barrier . . . serving at top-efficiency in hundreds of quick freezing and frozen food locker plants, in cold storage rooms and food processing plants. Whether you have small or large facilities for low temperature, you need Mundet Corkboard for these dollar-saving advantages:

LOW CONDUCTIVITY Mundet Corkboard provides the most efficient barrier to heat transfer due to its internal cellular structure of sealed dead-air spaces.

STRUCTURAL STABILITY The cellular structure of Mundet Corkboard maintains its shape and characteristics under rigorous conditions of service.

NON-ABSORBENCE Mundet Corkboard has no capillary attraction. This nature-made quality avoids absorption of dampness and odors. There is no swelling or loss of insulating value from moisture infiltration.

EASE OF INSTALLATION Mundet Corkboard is light in weight despite its strength. It cuts easily, readily holds nails or skewers; bonds with cement, asphalt or paint.

LONG-LIFE There is only one way to figure insulation cost. That is the over-all 'life-expectancy' of the material. Here, again, Corkboard is the choice, with thousands of installations to prove its durable service.

The best insulation requires competent installation. You benefit from the experienced erecting services that are offered by Mundet branch offices. Corkboard is available for prompt shipment from nearby warehouses. Send coupon for copy of Mundet Cork Manual. Prepared in convenient filing size, with cork specification data.

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2601 Cottage Grove Avenue

CINCINNATI 2
427 West 4th Street

DALLAS 10
601 Second Ave.

DETROIT 21
14401 Prairie Street

HOUSTON 1
Commerce and Palmer Streets

INDIANAPOLIS
15 E. Washington St.

JACKSONVILLE 6, FLA.
800 E. Bay St.

KANSAS CITY 7, MO.
1428 St. Louis Avenue

LOS ANGELES
(Maywood)
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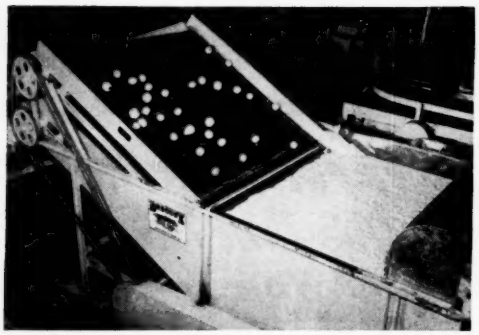
Food Equipment News



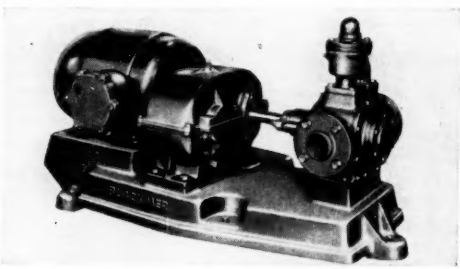
Frosted Fruit Separated Mechanically

Sorting of frost-damaged lemons is simplified by the Lemon Frost Separator, which achieves 96 percent accuracy in separating frosted and partially frosted fruit. In addition, sunburned and hollow centered fruit may be segregated successfully.

Separation is accomplished by passing the lemons through an oil emulsion having a specific gravity slightly less than water. Since good lemons are heavier than frosted fruit, they drop to the bottom of the specially designed tank and are removed on a roller conveyor. Frosted lemons float on or near the surface of the fluid and are removed on a similar conveyor set at a predetermined depth.

Good fruit is conveyed to the washer and handled in the usual way. Frosted fruit is either re-run through a slightly modified solution to salvage juice grades, or is rinsed and handled as rejects.

No claim is made for increased speed of operation. Results depend to a great extent on the operator, who must determine skin thickness, etc., of the particular lot, and then adjust the specific gravity of the fluid and the depth of the conveyors to draw off the desired quality of fruit.—*Brogdex Co., Pomona, Calif.*



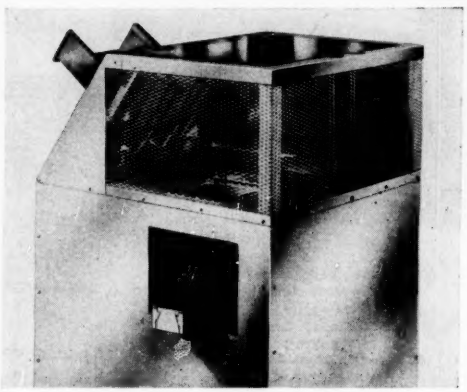
Sliding Vane-Type Rotary Pump Offered

Addition of sliding vane-type rotary pumps to a standard line of swinging vane-type pumps has extended the range of materials that can be handled.

Extremely viscous liquids up to 100,000 SSU. are said to be successfully pumped by the new sliding vane-type. Gasoline and other volatile liquids can be pumped more efficiently and at higher lifts.

Vanes are positively actuated by push rods through the rotor and shaft. They can be furnished in nonmetallic material in most instances, and they are reported to be relatively more quiet and wear resistant than conventional metal vanes.

Both sliding and swinging vanes are stated to be self-adjusting for wear and are replaceable without disturbing piping or drive. Swinging vanes are recommended for certain nonvolatile materials and for liquids containing solids and abrasive matter.—*Blackmer Pump Co., Grand Rapids, Mich.*



Cartons Set Up At High Speeds

Doughnut, bakery goods, and frozen food cartons are set up at high speed in a new model Tray-Lock machine.

New unit incorporates several operating refinements over the previous models. Lock-type trays and cartons are set up from flat blanks that require no pre-gluing.

Fully automatic, the machine requires no operator. Able to set up 70 cartons per min., it handles any size from $4\frac{1}{4}$ to 18 in. in width, 2 to 14 in. in length, $\frac{3}{4}$ to 6 in. in sidewall height, and $\frac{3}{4}$ to 6 in. in endwall height. Maximum size of carton blank is 16 by 20 in.—*General Mills, Inc., 400 Second Avenue South, Minneapolis 1, Minn.*

Non-Toxic Sprayer and Insecticide Work Fast

Less than $\frac{1}{2}$ hr. is required to treat 250,000 cu. ft. of enclosed space by a recently developed mechanical aerosol sprayer, with an insecticide concentrate safe for use around foods.

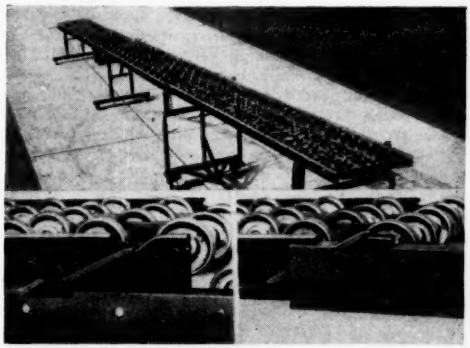
An innovation in insect control, the electrically-driven sprayer employs compressed air instead of liquefied gas as an aerosol misting agent. The insecticide newly formulated for its use, under the name "Gulfspray Concentrate", contains no DDT or other chlorinated killing agents.

Non-toxic to human beings, the dry-type mist imparts no taste or odor to foods when used as directed, and leaves no unsightly "dew" as a residue. The formula is supercharged with pyrethrum (0.95 percent) activated by piperonyl (0.67 percent) in an odorless petroleum base.

The power sprayer weighs 50 lb. and is mounted on rollers for easy handling. It is built to stand up under

hard industrial use. The hand gun attached to the compressor by air hose can also be operated from a stationary position on the equipment.

Heavier dosages are highly effective against crawling pests, such as roaches, waterbugs, silverfish, and the accessible stages of beetles, weevils and moths.—*Gulf Oil Corp., Gulf Building, Pittsburgh, Pa.*

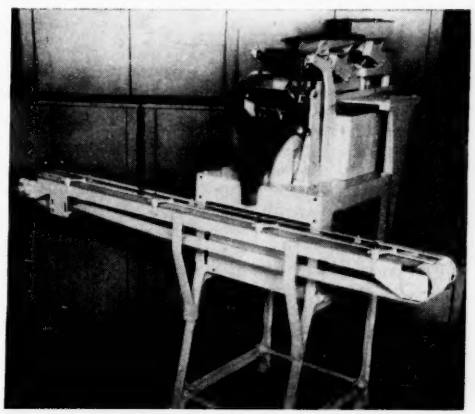


Sectional Conveyor Has Uniform Slope

Design improvements now incorporated in a new portable telescopic conveyor assure an even ride for the load.

The 5, 7½ or 10 ft. sections lock together when fully extended so that there is no step-down between sections. A simple, ingenious locking arrangement automatically assures correct positioning of the sections without bolts or clamps.

Conveyor is made in either wheel or roller types.—*Wilkie Co., 5520 Arch St., Philadelphia 39.*



Unit Speedily Weighs Dry Products

Manufacturers of dry products are now able to net-weigh at high speeds with superior accuracy, using a new automatic weighing machine.

Known as the Hy-Tra-Lee Model M, it employs a new method of weighing—"positive displacement", rather than the conventional beams or springs.

Principal components of the machine consist of the weighing unit or units each equipped with its own bucket dumping mechanism, vibratory in-feed, basic frames and drive, and conveyor and container register for fully-automatic weighing and filling. The number of weighing units in one machine is variable from one to four.

If more than one weighing unit is used, discharge of product from bucket into container may be through individual spouts into specified containers or through a common spout into a single container.

Regulation of the entire machine is obtained at the electrical control panel, accessible from the front or back of the machine. The dumping mechanisms and container register are driven by one ¼ hp. ratiomotor, 110v. single phase or 220v. 3-phase, 60-cycle current. The conveyor is driven independently by another ratiomotor of the same rating.

All parts contacting the product are non-corrosive and easily cleaned. Weight range of the machine is from ½ oz. to 16 oz. net, with a control dial giving the fine adjustment necessary to obtain exact weight desired in intermediate ranges.—*Wright Machinery Co., Durham, N. C.*

Handling System Eliminates Shipping of Pallets

To make possible mechanized shipment of merchandise without the use of pallets, a new pallet push-pull attachment for electric fork trucks has been announced.

The attachment includes multiple forks, a device for pulling loads on board, and a device to push them off the forks into position.

The pallet is corrugated metal and has two sets of openings which permit the truck to lift the load and pallet together or to remove the load from the pallet. Combined use of the push-pull attachment and the special pallet makes it possible to perform a complete mechanized materials handling operation, without the long-standing problem of using pallets in transit. This is how the system works:

Before the load is palletized at the start, it is placed on a sheet of heavy paper. Then, paper and load are drawn onto the forks of the truck, lifted slightly, and placed on the pallet. At this point the merchandise can be carried, stacked, and detiered in the usual manner.

When ready for shipment out of the plant, the load, still on a pallet, is detiered and taken to the shipping dock. There the forks are inserted in the second set of openings in the pallet, and the load together with the paper sheet is lifted clear. The truck then takes it into the box car and the new attachment pushes it into position.

Merchandise travels without pallets, but is ready for mechanized handling when it is received at the delivery point.—*Automatic Transportation Co., 149 W. 87th St., Chicago.*

(Food Equipment Continued)

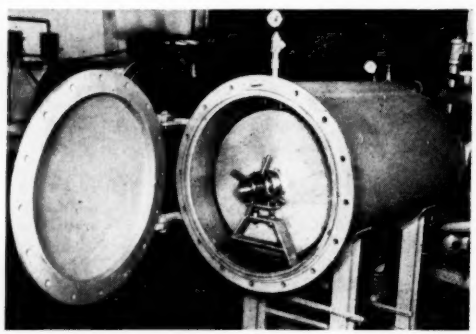
Plastic Rollers Employed in Portable Conveyor

Lightweight, tough Tenite plastic is used for the rollers on a portable conveyor with aluminum or magnesium frame.

The conveyor is made in 10 ft. sections to load and unload cartons from trucks, and for interdepartment handling of cartons. Each section weighs only 31 lb., and has a distributed load capacity of 500 lb. Units can be hooked together in a series. Overall width of the conveyors is 12⅞ in.

The plastic rollers, transparent tubes produced by extrusion, are of 2 in. dia. and 10 in. long. Roll heads are injection-molded black Tenite disks cemented into the ends of tubes. Bearings are press-fitted in the roll heads. Axles running through the center are held in the frame by means of cotter pins. Intervals of 4 in. between centers separate the rollers.

Tenite rollers replace steel tubing and skate wheels for this application. They are resilient, have high impact strength, resist outdoor exposure and dirt, and are corrosion-proof. Rolling performance of the plastic roller is reported to be superior.—*Alvey Conveyor Mfg. Co., Broadway, Wyoming & Seventh Sts., St. Louis 18, Mo.*



Rotating Leaf Filter Is Easily Cleaned

Leaves are center hung on a rotating shaft in a new type of 48 in. leaf filter. Provision is made for flushing away the sludge and used filter mediums with sprays, without opening the door of the filter at any time.

At present, this new labor-saving filter is used primarily in water filtration, though it may also be used for some light aqueous solutions.

During the cleaning operation, the leaves are rotated slowly and water is sprayed on both sides of the screens, removing the sludge and exhausted filter mediums. They are drawn off from a sump at the bottom of the filter. A motor-driven worm can be provided for this purpose, if the nature and amount of solids make this desirable. For normal clarification with thin precoats a worm is not needed.

Filter leaves, which are keyed to the discharge shaft, are rotated by means of a motor-driven worm gear at the back of the filter. If a discharge worm is incorporated it can also be driven from the main rotating shaft.

Discharge of filtered materials is through the center shaft which passes through the back of the horizontal tank. The leaves are slid over the discharge pipe, which is perforated to take the discharge from each individual leaf.—*Hercules Filter Corp., 204 21st. Ave., Paterson, N. J.*

Fat Determinator Saves Time

To record how much fat there is in hamburger, or other ground meats, an instrument called the lipometer has been devised. In a few minutes' time, it provides information which heretofore required three or four days to obtain by the ether extraction test.

New instrument operates on the principle of the hydrometer. Instead of determining the specific gravity of the fluid in which it floats, it uses cold tap water to determine the fat content of the fixed volume of sample contained in the chamber.

Technic of packing the chamber and adjusting reading to varying water temperatures is relatively simple. Accuracy within 1 percent is possible. Manufacturer assures accuracy within 2 to 3 percent.—*Instruments, Inc., Crystal Palace Bldg., San Diego, Calif.*

Powered Wire-Belt Conveyor Travels Curves

Development of a powered, wire-mesh belt conveyor, that can travel around almost any desired curve is announced.

Through the use of a newly patented conveyor chain, a balanced weave wire-mesh belt is guided in practically any arc. Wear on the edges of the belt is averted because they do not drag against guides.

This conveyor may be used in conjunction with other flat conveyors, or continuously on straight and curved runs. —*The Leeds Electric & Mfg. Co., Hartford, Conn.*

(Food Equipment Continued)

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- Rotary Compressor creates spray (this is not a fan-type unit)
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- Container withstands chemical action of insecticides
- Precision built to save time and labor and for trouble-free years of service
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- Specially built-in fuse assembly protects against burn-outs
- Utilizes every drop of insecticide
- Instantaneous and continuous full pressure spraying
- Density of spray easily regulated by air volume control dial
- Ball bearings hermetically sealed
- No condensation of steam or water to dilute insecticide

USE WEST'S VAPOSECTOR FLUID, A HIGHLY CONCENTRATED INSECTICIDE ESPECIALLY FORMULATED FOR MOST ECONOMICAL AND EFFICIENT RESULTS WITH THE NEW MISTORIZER.

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Cambridge Balanced Belts give fast continuous handling of spinach through washing, sorting, blanching. Open mesh permits free drainage and rinsing.

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Fast continuous production—improved, more uniform products—work area savings—reduced accidents from manual handling—PLUS reduced handling costs by freeing manual labor for other jobs.

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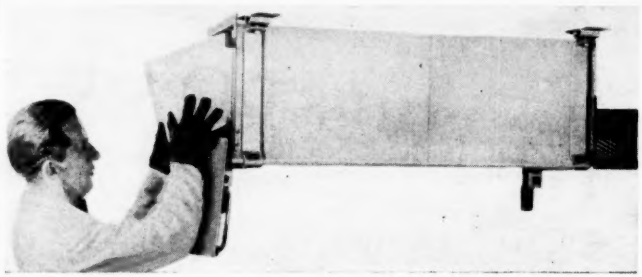
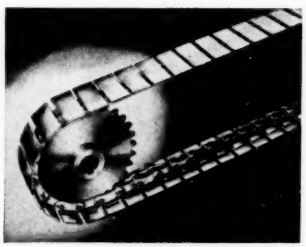


Dry Ice Truck Bunker Offers Low Cost Refrigeration

For transportation of frosted foods by motor, this newly designed dry ice truck bunker affords effective refrigeration at a low cost. Constructed of reinforced aluminum, the bunker holds dry ice over a 2-in., enclosed air duct, through which air is forced by a Sirocco fan. The air circulates throughout the truck.

According to the maker, formation of slick on the transported products is prevented by air circulation and by dry ice.

Bunker is hung on studs (two ceiling and two wall) which facilitate removal and maintenance. They are made in two sizes—the 38 lb. size holding 100 lb. of dry ice, and the 52 lb. size holding 200 lb. of dry ice. Fan is operated by regulation truck batteries.—*Foster-Built Bunkers, Inc., 757 W. Polk St., Chicago 7.*



Conveyor Chain Features All-Welded Construction

Unit-conveying of bottles, cans and small package goods is accomplished by a new platform conveyor chain. Smooth, steady travel for all types of bottles and package goods, regardless of length and speed of conveyor line, is reported by the maker.

Design features all-welded construction, which helps to keep the chain clean and sanitary. Tapered head-pins make chain assembly or disassembly easy, and help to eliminate spreading of side plates. Cotter keys are on one side of the chain for easy maintenance. Top plates have new style beveled edge for safe transfer of material. Roller chain construction has no hinge joints operating under tension, therefore shock loads are absorbed and cushioned. —*The Whitney Chain & Mfg. Co., Hartford 2, Conn.*

Irregularly Shaped Items Wrapped Automatically

Heads of lettuce, fruit cake, ham shoulders, and picnic packs are automatically wrapped by the new Form Wrap machine.

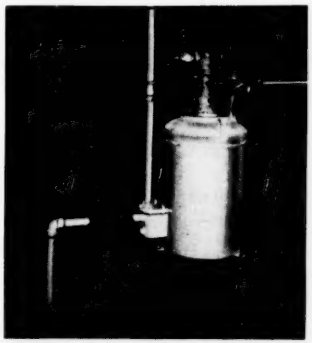
An operator places the required size of a sheet of film (cellophane) over a 9 in. dia. aperture on top of the machine. She next lays the item to be wrapped on the film, then pushes it through the aperture (see photo). The product rests on a ring which is slightly spring loaded, so that it goes down no further than the operator desires, usually a depth equal to its own diameter. When two switches are hit, one with each hand (to insure safety), a pair of sealing and cutting jaws comes together.

Sealing is accomplished under heat and pressure in approximately 2½ to

3 sec. Action of the pair of jaws coming together neatly gathers the cellophane material, and forms a tight wrap around the object. Jaws come open, and the item is guided down to a chute.

At this cycle of the operation, the spring loaded basket drops, permitting the product to fall to the chute, and then goes into its former position, readying the machine for a similar cycling.

A single operator will wrap between 10 and 15 items per min. Machine utilizes a ¼ hp. motor. It is 36 in. from floor, and measures 51 x 36 in.—*Triangle Package Machinery Co., Dept. C, 6633-55 West Diversey Ave., Chicago 35.*



Pneumatic-Operated Pump Handles Various Liquids

Operated by compressed air from 30 to 50 psi., the new SK Ejectopump handles without aeration liquids of varying characteristics, at temperatures up to 120 deg. F. and higher depending on lift.

Pumps have a maximum suction lift of 25 ft. and discharge heads up to 55 ft.

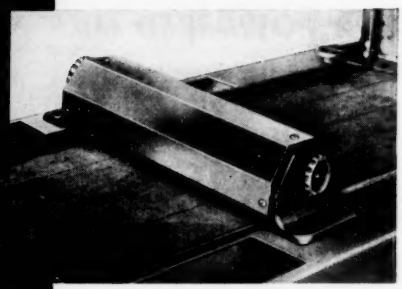
No impellers or rams are used, nor is the liquid being handled violently agitated or stirred. Lubrication is not required—an advantage in industries where traces of contamination would result in spoilage. Gritty and corrosive matter can be pumped without damage to the equipment as there are no glands and no bearings.

By use of special suction and discharge valves, suspended or included solids of considerable size can be pumped. Unit is self-priming and includes an arrangement for blowing down the whole apparatus.

Operation of the pump is entirely pneumatic. A rhythmic cycle of suction and discharge is maintained automatically. Air-operated ejector in the pump head creates a vacuum throughout the pump and draws the liquid

(Food Equipment Continued)

IRON PARTICLES JUMP AT THE *Bauer* TABLE MAGNET



OPERATORS at picking tables couldn't detect the chips and flakes of iron or steel which the Bauer Table Magnet attracts. After candies, fruits, vegetables, nuts, or seeds have passed under the magnet, the amount of metal adhering to it is astonishing. If these particles had been left in the material, the quality of the product and the reputation of the brand would have been injured.

Bauer permanent magnets are powerful. All parts are entirely rustless. Included with each magnet is a 10-year guarantee certificate. Sizes are available for table or belt widths of 8 to 72 inches. Complete information will be sent upon request. Write, wire, or telephone.

THE BAUER BROS. CO., SPRINGFIELD, OHIO

You'll want this valuable book—it tells how to cut steam operating costs, control quality and increase production.

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FOR INCREASING PRODUCTION AND IMPROVING QUALITY WITH STEAM PROCESSING EQUIPMENT
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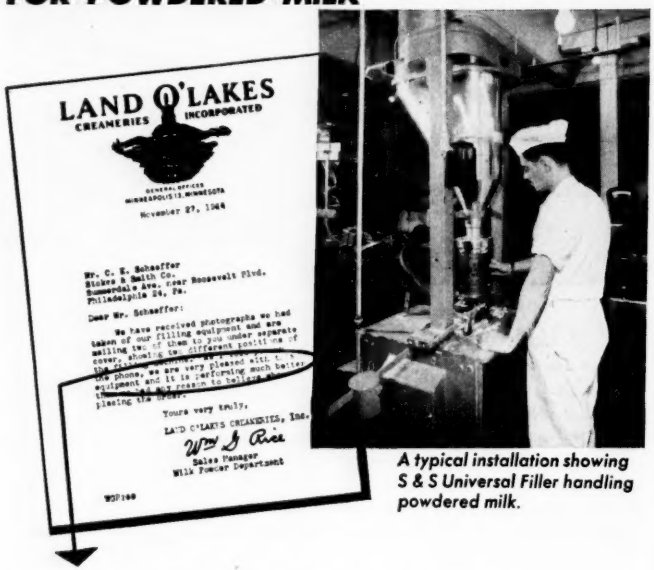
FILLING MACHINES FOR POWDERED MILK



A typical installation showing S & S Universal Filler handling powdered milk.

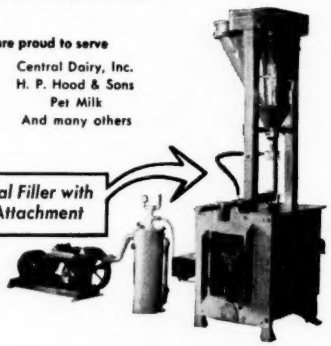
"...we are very pleased with this equipment."

Many of our good customers (such as Land O'Lakes) are using Stokes & Smith equipment for packaging Powdered Food Products or Powdered Chemicals, and they report *performance beyond their expectations.*

Stokes & Smith have a reputation built over a period of 48 years in the filling and packaging of dry products. Our facilities for creative research, skilled engineering, quality manufacturing and sustained service are ready to serve you. Write us for complete details.

A few of the companies we are proud to serve

Dean Milk	•	Central Dairy, Inc.
General Packaging Corp.	•	H. P. Hood & Sons
Maple Island Farms	•	Pet Milk
Swift & Co.	•	And many others



STOKES & SMITH Co

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Subsidiary of Food Machinery and Chemical Corporation

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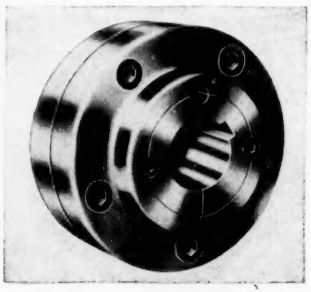
Exclusive West Coast Distributor
Anderson-Barngrover Division of FMC
San Jose 5, California

into the case. When the pump case is nearly full, the ejector shuts off, and the flow of air is diverted into the pump case.

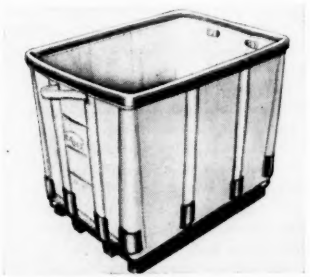
The liquid is discharged by displacement through the delivery pipe non-return valve. Before the pump case is entirely empty, the cycle is repeated.—*Schutte and Koerting Co., 12th and Thompson Sts., Philadelphia 22.*



Shafts Connected Easily With New Coupling

Ends of two shafts may be rigidly connected by "Taper-Lock", a new rigid coupling.

The unit permits easy coupling or disengagement of shafts with the equivalent of a shrunk-on fit simply by tightening two set screws. This coupling has a male and female joint and is machined all over. It is available in sizes up to and including 5 in.—*Dodge Manufacturing Corp., Mishawaka, Ind.*

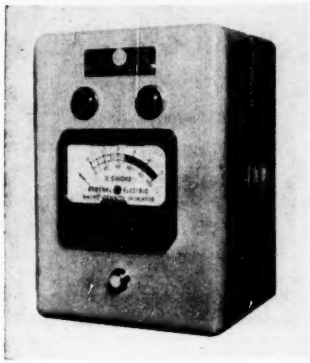


Handling Bags Are Made Of Vinyl-Treated Canvas

Food and ice handlers will be interested in a new line of vinyl-treated canvas baskets, trucks and bags. According to the maker, seven important factors make these products superior to standard canvas carriers.

They are washable (wipe off with a damp cloth or may be easily hosed),

waterproof, long wearing (resist abrasion 2½ times more than untreated canvas), and oil- and grease-repellent. Actual mildew tests proved a gain in tensile strength where canvas lost 50 percent. They will take up to 300 deg. F. heat without damage, and will not shrink. The vinyl impregnated canvas, known as Sanitex, is produced by methods evolved by the company's engineers. Standard color is silver, with other colors and natural available upon request.—*C. R. Daniels, Inc., Daniels, Md.*



Smoke-Density Indicator Aids Law Compliance.

To indicate industrial smoke density levels, thus facilitating compliance with smoke abatement ordinances, is purpose of new smoke density indicator and control.

This equipment can also be used to control over-the-fire heated air to the fire box to reduce excessive smoke, thereby improving fuel consumption and boiler efficiency.

Available immediately in one packaged unit, the new equipment consists of a light source, a phototube holder, and an enclosed control which incorporates an indicator calibrated in Ringlemann units. If desired, a recorder, either of continuous strip chart type or circular "step" type, can be furnished.

In operation, a magnetic relay is set to operate when smoke density reaches some predetermined level, such as 35 percent, at which time a blower forces over-the-fire heated air to firebox, until smoke density drops to approximately 15 percent. If smoke density rises again, relay is immediately energized. Each time relay operates, an alarm is sounded to warn boiler operator to adjust drafts for more complete fuel combustion.

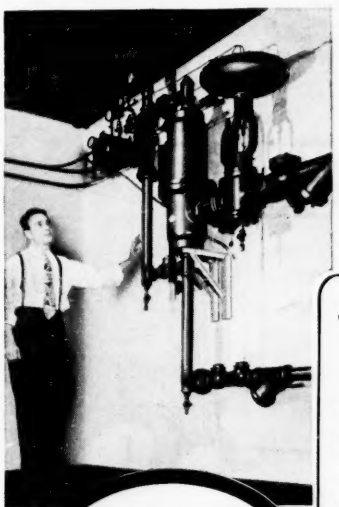
Used in conjunction with this equipment is a chart type recorder which

(Food Equipment Continued)

SLASH HOT WATER COSTS UP TO 1/3 OR MORE!

... and give yourself all This

- **Any VOLUME of Hot Water INSTANTLY** — Save Space! Eliminate storage tanks and related heating facilities!
- **Immediate Adjustment to Any Desired Temperature** — Waste neither water nor time waiting for proper temperature ... you are ready to go to work when steam is up in boiler!
- **Smooth, QUIET Operation at ALL VOLUMES** — Transfer heat from steam to water — no banging or rattle!
- **Automatic Temperature Control of Large or Small Quantities of Water** — Automatic adjustment to compensate for changes in pressure and volume!



Pick STEAM INJECTION INSTANTANEOUS HEATERS

These and more benefits can be yours with the PICK Instantaneous Steam Injection Heater. Seven sizes (10 to 200 gal. per min.). Patented "Pressurizer Piston" assures trouble-free performance. Easily, economically installed in old or new systems. Write for Bulletin WH-11

PICK MFG. CO.
389 Alan Ave., West Bend, Wis.

Jot Down These Figures!

Estimate Your Annual Hot Water Costs

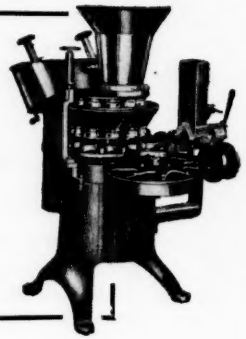
Coal, oil or other fuel . $_____
Water . . . . . $_____
Maintenance of system . $_____
Miscellaneous . . . . $_____
TOTAL $_____

If your above costs are over $500, it should pay you to write Pick immediately for complete "Engineering Analysis Forms".

CRCO-AYARS FILLERS

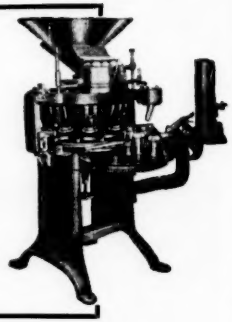
Pea and Bean

For peas, limas, hominy, whole-grain corn, pork and beans, red kidney beans, diced fruits and vegetables and similar products. Available with brining or saucing attachment to deposit all before fill or half before fill and balance after. Delivers accurately measured fill in tin or glass. Available for immediate delivery in 5 or 10-pocket models.



Universal

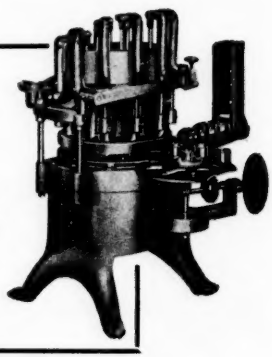
For tomatoes, cut stringless beans, quartered or halved apples, berries, whole beets, whole potatoes, plums, apricots and similar products. Insures a measured, accurate fill without crushing the product and a measured amount of juice to each container.



Plunger Type

For pumpkin, apple sauce, concentrated soups, purees, chili con carne, dog foods and like products. Will deliver a measured, accurate fill at high speed.

Write for complete details and prices.



THE BEST OF Everything

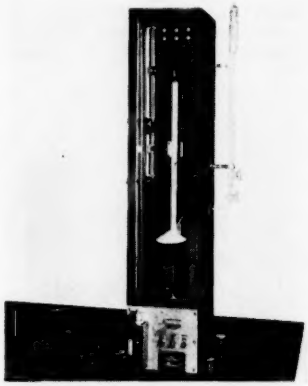
CHISHOLM-RYDER CO. INC.

Niagara Falls, New York

FOR THE FOOD PROCESSOR

269

provides a continuous record of smoke density. It can also be employed as a measure of general operating efficiency as well as a proof of smoke ordinance compliance. — *General Electric Co., Schenectady 5, N. Y.*



Solvent Evaporation Rates Determined by New Unit

Developed exclusively for the determination of evaporation rates of all solvents with a viscosity less than 100 cp. is the "Precision" Shell evaporometer. It can be used most advantageously by research workers in organic chemistry.

The automatic filling microburet releases a sample on the filter paper cone which is suspended from a helical quartz spring and is rotated by a motorized electromagnet to distribute the sample evenly. After the cone is "freed", the sensitive spring rises as the sample evaporates.

Knobs on the outside of the case raise or lower the spring and cone assembly, the centimeter scale, and the mirror. When the sighting disk just above the cone and its reflection are aligned with a scale calibration, an exact height reading is obtained.

The case is fitted with an outlet for a timing mechanism which can be operated by a switch on the nameplate panel. All switches are conveniently located on this panel. The case is finished in brown Hammerloid enamel.

Volume of air drawn through the apparatus is indicated and controlled by an adjustable rotameter. A serrated hose connection at the base is provided for connection to a vacuum line. Overall dimensions are: 1½ in. wide, 12 in. deep, and 41 in. high.— *Precision Scientific Co., 3737 W. Cortland St., Chicago 47.*

—*End*

One of two Eriez Permanent Magnetic Drums at the Kellogg Company, Battle Creek, Michigan used to remove both fine and larger pieces of ferrous metal. Note how Drum has been installed in conjuncton with two conveyors. One above unit—one below.

KELLOGGS don't put up with metal contamination

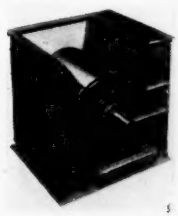
They put *Eriez* on the job.

THE new Eriez Non-Electric Permanent Magnetic Drum pictured here was just the answer for removing tramp iron in processing 30% moist bran at Kelloggs', Battle Creek, Michigan. Placed at the discharge end of their screw conveying lines, Eriez Drums efficiently handle large volumes of bran and provide automatic removal of ferrous metal. There's no chance of contamination in Kellogg products because Eriez Protection has really been put to work. Throughout their modern well equipped plant, all types of Eriez units are assuring necessary protection. For instance, Eriez Permanent Magnetic Pulleys for belt conveyors, Eriez Magnetic Drums, and a score of Eriez Plate Magnets in gravity flow chutes. Eriez protection pays big dividends . . . low installation cost . . . no operating costs . . . elimination of machinery damage . . . prevention of production stoppage.

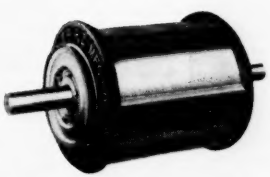
A new 4 page bulletin describing Eriez Magnets for food applications is now available. Write for your FREE copy today.

Eriez drums are available in these models .....

DF-101—Furnished complete with housing and feeder attachment. Completely self-cleaning and dust tight.



DF-102—Compact cubicle housing for minimum space requirements. Self-cleaning and dust tight.



Magnetic Drum without housing but complete with shaft and sheave.

Pioneer of **PERMANENT** Magnetic Separation

SEE OUR CATALOG IN SWEET'S

See our catalog P $\frac{1b}{2}$ Sweet's Processing Industries File

ERIEZ MANUFACTURING COMPANY

101 East 12th St. • ERIE, PA.

BACK IN THE 1880's

WHEN DAIMLER INVENTED
THE GASOLINE ENGINE

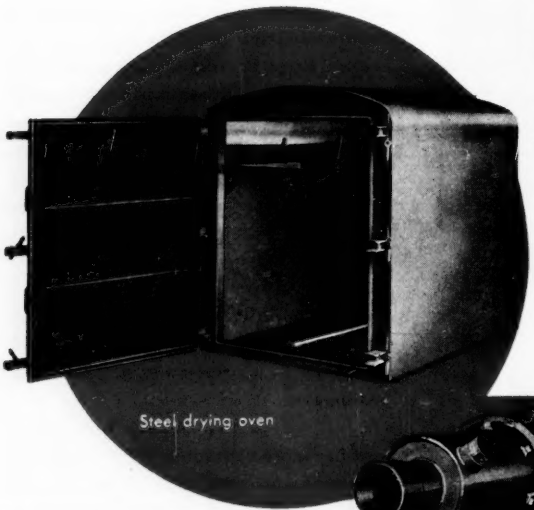
Koven

WAS MAKING INDIVIDUALIZED
FOOD EQUIPMENT

KOVEN engineers and craftsmen have 68 years of individualized food equipment experience. Every unit they build is designed to meet the specific requirements of the job it's going to do. The result is greater efficiency and economy for food plants. Now is the time to lower the unit cost of your product by installing KOVEN time and money-saving equipment. Call or write—no obligation. At your service: machine, welding, painting and galvanizing shops, plus X-ray inspection.

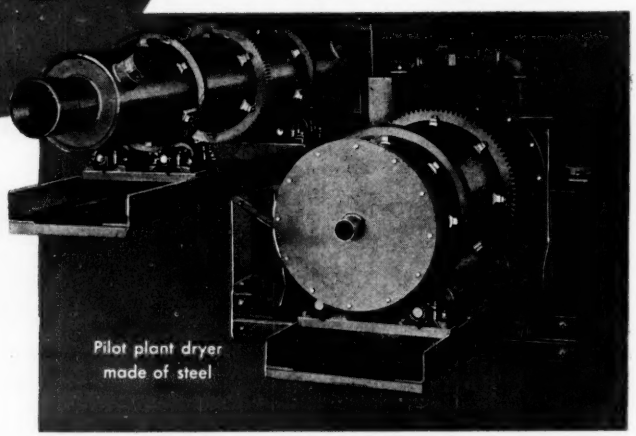
Among the many KOVEN products in all commercial and non-corrosive metals: Stainless Steel; Aluminum Sheet Fabrication; Boxes, Tote, Waste Cans; Chemical Apparatus; Coils and Pipe Bands; Copper Sheet Fabrication; Galvanizing Work; Mixers, All Kinds; Monel Metal Fabricators; Pails, Special, Heavy; Pans, All Types, All Metals; Sinks, Scullery and Factory; Tables, Galvanized or Monel; Tanks, All Types, All Metals; Kettles, All Types, All Metals.

L. O. KOVEN & BRO., INC.
154 Ogden Ave., Jersey City 7, N. J.



Steel drying oven

Plants:
Jersey City, N. J. Dover N. J.



Pilot plant dryer
made of steel

KOVEN FOR INDIVIDUALIZED FOOD EQUIPMENT SINCE 1881

Catalogs, Bulletins

Food Plant Equipment

For the Candy Plant

All-steel Mogul, built to operate up to 25 boards per min., a chocolate bottomer, new enrober, hard candy continuous cooker, and other candy equipment designed for continuous operation are described and illustrated in three dimensional "pop up" folder.—*National Equipment Corp., 153 Crosby St., New York City 12.*

Refrigeration System Purger

How air and other non-condensables get into refrigeration systems, and the adverse effect this has on operating costs and efficiency, are delineated in 8-page Bulletin 192. Forged steel purger is suggested for prevention. Installation data, specifications, charts, tables, and prices are included.—*Armstrong Machine Works, Three Rivers, Mich.*

Chlorinizer

Automatic safety devices, an accurate rate indicator, wide range metering without changing orifices or scales, and bell jar indication of effective vacuum are features of cabinet-type chlorinizer detailed in Bulletin 840-F2.—*Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.*

Liquid Candy Depositor

Sugar wafers, cream mints, caramel on nuts, or liquids in molds for specialty pieces, can be deposited on stackable trays or mats at rate of 24 per stroke by new liquid depositor. It is pictured with description on information sheet.—*Harry L. Friend Co., 200 Old Colony Ave., S. Boston 27.*

Heat Sealing

Continuous band sealer for heat sealing such films as Saran, polyethylene, Polythene, Pliofilm, the vinyls, and foils and laminates, and for applying saddle labels to bags, is covered in 4-page folder. Bag making attachment, specifications and manner of operation are detailed.—*Doughboy Industries, Inc., New Richmond, Wis.*

Air Conditioning

Typical installations of compressors are treated in illustrations and text of 4-page house organ, *The Frick System*, Vol. 20, No. 6, which also announces a new edition of Bulletin 80 (C) containing entire line of air conditioning, refrigerating, and ice-making machinery.—*Frick Company, Waynesboro, Pa.*

Cold Storage Doors

Doors for moderately low temperatures, for zero and sub-zero use, and for special purposes are covered in 12-page catalog. Special designs for passing kegs, cans, crates and ice cream cans, and with built-in chutes are detailed.—*Jamison Cold Storage Door Co., Hagerstown, Md.*

Pellet Mill

Improvements in Simplex pellet mill, described in 12-page Booklet P-12B, include stainless steel feeder-conditioner, new feeder-conditioner drive, elimination of vibration, and sealing against dust leakage.—*Sprout, Waldron & Co., Muncy, Pa.*

Pressure Drop Chart

Selection of most efficient size and type of steam separator, and determination of pressure drop through the separator are facilitated by use of a new pressure drop chart. Instructions and typical examples are given.—*Wright-Austin Co., 315 W. Woodbridge St., Detroit 26.*

Grinders

Center feed preventing shock loads against the power source, a graduated rotor, long taper ledges, and a cone screen are features of gradual reduction grinder detailed in 4-page folder.—*Prater Pulverizer Co., 1825 S. 55 Ave., Chicago.*

Tanks and Accessories

Mixing and storage tanks, strainers, valves and pipe fittings, a table of tank resistance to various media, and other sanitary fitting information, are included in 12-page booklet.—*Metal-Glass Products Co., Belding, Mich.*

Rotameters

Electric, electronic and pneumatic recording and controlling rotameters are illustrated by photos, cut-away views, and sectional drawings and described in text in Bulletin 18-RC. Construction, operation and application of rotameters are covered.—*Advertising Dept., Schutte & Koerting Co., 12 and Thompson Sts., Philadelphia 22.*

Steam Traps

Stainless steel construction and doubled condensate and air venting capacities feature thermostatic steam traps detailed in Bulletin 250-A.—*Sarco Co., Inc., 350 Fifth Ave., New York City 1.*

Piston Pump

Positive displacement, assuring continuous flow, is feature of Votator corrosion-resistant duplex piston pump discussed with specifications on information sheet.—*The Girdler Corp., Votator Div., Louisville 1, Ky.*

Water Conditioning

Cooling and conditioning of water for bakery use in high speed dough mixing are functions of equipment covered in Forms 733 and 200.—*Filtrine Mfg. Co., 53 Lexington Ave., Brooklyn 5.*

Steam Generator

Automatic Clayton steam generator builds up to 100 lb. from cold start in less than 5 min., reports 8-page folder. Small space required and economical operation are other advantages cited.—*Cherry-Burrell Corp., 822 W. Washington Blvd., Chicago 7.*

Infra-Red Ovens

Drying, baking, and preheating operations in the food industries may be accomplished with high efficiency using infra-red ovens, states 8-page detailed booklet.—*Triangle Equipment Co., 45 River Road, Nutley, N. J.*

Materials Handling

Wire Belting for Conveyors

Flat, flexible wire belting, never less than 85% open, is stated in 6-page folder to allow free flow of air and fluids through the belt. Maker says beltings make cleaning easier, and afford positive, accurate drive. Specifications and lacing instructions for belts are included.—*Wire Belt Co. of America, 750 Main Street, Cambridge 39, Mass.*

Pallets

Standard and special wooden pallets, and expendable pallets, are illustrated with diagrams and photos in 16-page booklet. Descriptions of construction and normal load limits, also suggestions for use are detailed.—*National Pallet Corp., Oliver Bldg., Pittsburgh 22.*

Conveyor Chains

All-welded construction of level line conveyor chains is reported in 12-page Bulletin LL-49, to result in greater cleanliness in unit conveying of bottles, cans, and small packaged goods. Dimensions, specifications and prices are given.—*Whitney Chain & Mfg. Co., Hartford 2, Conn.*

Tiering Wood Pallets

Standard-type wooden pallets, equipped at corners with vertical steel tiering posts and detachable alignment and nesting cones, which provide a self-aligning, flexible tiering method for uneven or crushable materials, are illustrated and described in 4-page folder.—*The Paltier Corp., 53 W. Jackson Blvd., Chicago 4.*

Palletless Squeeze-Lifting

Box clamp and carton clamp are two new Load-Grab arms which bring number of interchangeable side-squeezing attachments for lift trucks to seven, reports Form 1123. The new arms and the older rubber-faced, spike-faced, drum handling, and pallet load arms are illustrated in action on 2,000- and 4,000-lb. capacity trucks.—*Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.*

Pneumatic Conveying

Systems for handling solid materials under moderate pressures are schematically illustrated in 8-page Bulletin 102. There are special sections included on handling flour and cake mixes and grain. Also shown is tank car that can be filled and emptied pneumatically.—*Convair Corp., 1501 Potomac Ave., Pittsburgh 16.*

Lift Truck

Loads of 7,500 lb. are carried with speed and high maneuverability by gasoline-powered lift truck, reports Form 1057B. Construction details and action photos appear in 16-page brochure.—*Hyster Co., 1800 N. Adams St., Peoria 1, Ill.*

Control Equipment

Flow Measurement

Safety shielding and easy readability of individually calibrated scales characterize rotameters featured in 4-page Bulletin 6. Dowel pin construction for low maintenance costs and use of stainless steel for corrosion resistance are other reported advantages.—*Brooks Rotameter Co., Lansdale, Pa.*

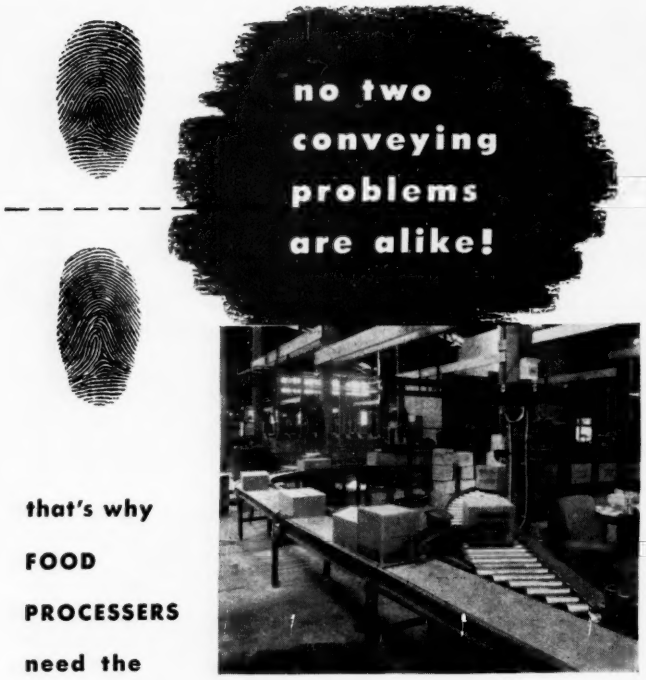
Indicating Pyrometer Controller

Process variables, such as temperature, voltage, amperage, pressure, and speed, are measured and indicated by new Multi-Switch Capacitrol, illustrated and described in Bulletin MC-1.—*Wheelco Instruments Co., 847 W. Harrison St., Chicago 7.*

Steam and Liquid Control Equipment

Pressure and temperature regulators, individually or in combination, float valves, water gages, and steam traps are included with dimensions, capacities, engineering tables and specifications, in 60-page Catalog 49. Equipment is applicable to grain heaters and flour

(Catalogs, Bulletins Continued)



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FOOD
PROCESSERS
need the
FINGERPRINT
ENGINEERING
that comes with

ALVEYORS*

the word for every conveyor need

There are many possible layouts for moving cases, cartons, and units of merchandise from one operation ... and from one department ... to another. But for one individual plant there is one best, most efficient, economical way. As no two fingerprints are alike ... so is your plant different from the others! Alvey Conveyor Mfg. Co.'s experience in the food industry ... with well-known installations from coast to coast ... speaks for Alvey flex-ABILITY ... for Alvey's fingerprint approach to every conveying problem.

*Trademark

heaters in mills.—*O. C. Keckley Co., 400 W. Madison St., Chicago 6.*

Defrosting Controls

Controls for defrosting of commercial refrigeration equipment are suggested in Bulletin 4940. Additional Bulletin 4941 covers time switch designed for water spray defrosting. Both are illustrated with wiring diagrams and photos.—*Paragon Electric Co., Two Rivers, Wis.*

Pressure and Vacuum Gages

Complete line of pressure and vacuum gages for indicating, recording, and controlling is covered in 32-page Catalog 7000.—*Minneapolis-Honeywell Regulator Co., Brown Instrument Co. Div., Wayne Ave. & Manheim Sts., Philadelphia 44.*

Plant Supplies

Insecticidal Floor Wax

Liquid water-emulsion wax, reports 4-page folder, provides high gloss with no rubbing, and is stated to kill roaches, waterbugs, ants and silverfish within 24 hr. Other advantages cited include anti-slip properties, non-inflammability, and low toxicity.—*Windsor Wax Co., Inc., Hoboken, N. J.*

Cleaning Compound

Versatility for over 40 cleaning operations is emphasized in 12-page Permag Bulletin 168. Compound is said to be non-toxic, non-flammable, non-corrosive, and non-abrasive, as well as economical.—*Magnuson Products Corp., 50 Court St., Brooklyn 2.*

Structural Tile

Functions and construction details of glazed and unglazed structural tiles are featured in following series of colored bulletins: 1950 Color Standards for Facing Tile; Ceramic Glazed Vitritile; Modular Dri-Speedwall Tile, Buff Unglazed; Modular Glazed Vitritile, Series 4-D, 8-W, 6-T; Salt-Glazed Load Bearing Dri-Speedwall Tile; and Decorative Modular Box Cap-Mold.—*National Fireproofing Corp., 202 E. Ohio St., Pittsburgh 12.*

Transparent Packaging Film

Boxes with windows of Lumarith film, and tomato tray overwraps of the same plastic sheeting, are considered in house organ, *Celanese Plastics*, Vol. 7, No. 5.—*Celanese Corp. of America, 180 Madison Ave., New York City 16.*

Above-Ground Masonry Repair

Leaks and water seepage due to breaks or hair-cracks in masonry and concrete structures are reported in folder to be easily repaired by Stontite compound.—*Stonhard Co., Dept. FI, 500 Stonhard Bldg., 1306 Spring Garden St., Philadelphia 23.*

Flavor Bases

Directions for use of essential oils, aromatic chemicals, vanilla and flavor bases are indicated in wholesale list.—*Dodge & Olcott, Inc., 180 Varick St., New York City 14.*

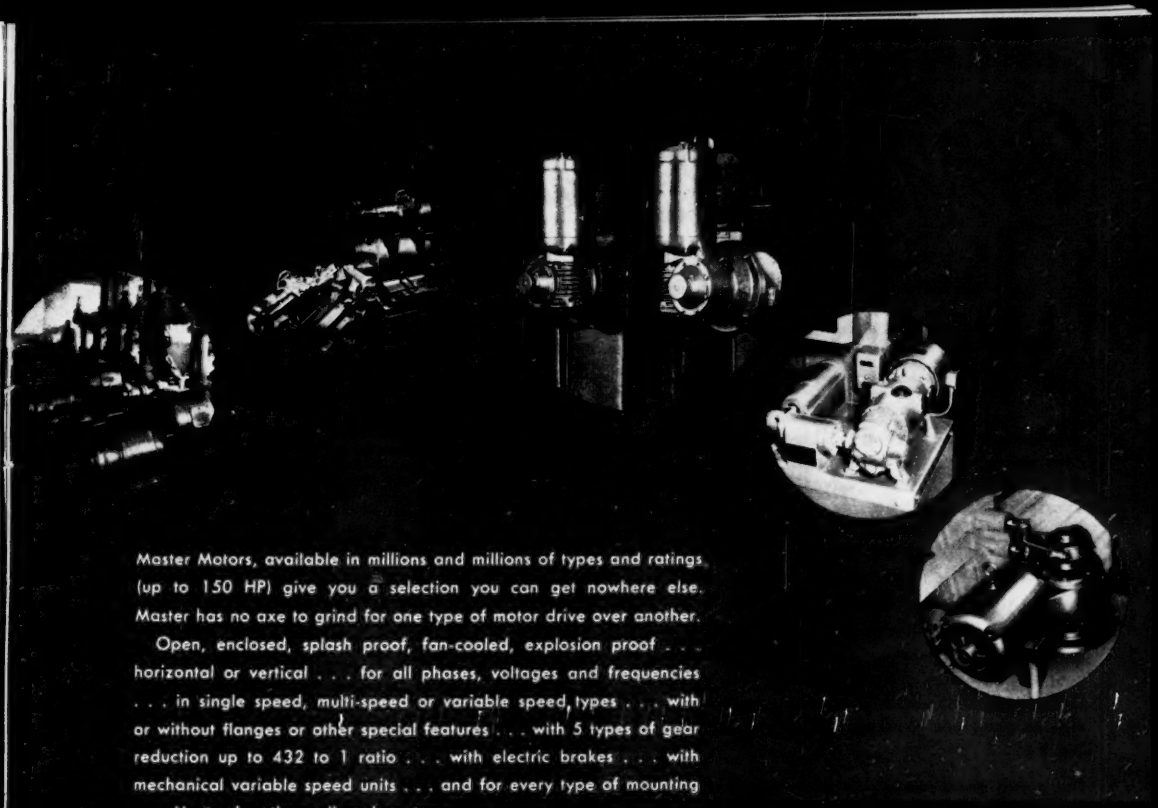
Painting of Exterior Masonry

Selection and use of finishes for porous exterior walls are described in article digest of National Bureau of Standards LC915 in house organ, *Paint Progress*, Vol. 7, No. 4.—*The New Jersey Zinc Co., 160 Front St., New York City 7.*

Synthetic Organic Detergent

Resistance to hard water, large solubility

(Catalogs, Bulletins Continued)



Master Motors, available in millions and millions of types and ratings (up to 150 HP) give you a selection you can get nowhere else. Master has no axe to grind for one type of motor drive over another.

Open, enclosed, splash proof, fan-cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed or variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 432 to 1 ratio . . . with electric brakes . . . with mechanical variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best motor drive for YOU. So don't put up with make-shift assemblies when it is so easy to get the RIGHT horsepower, the RIGHT shaft speed, the RIGHT construction features, the RIGHT mounting . . . all combined into one compact power package.

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Select the RIGHT power drive from Master's broad line and you can increase the saleability of your motor-driven products . . . improve the economy and productivity of your plant equipment.

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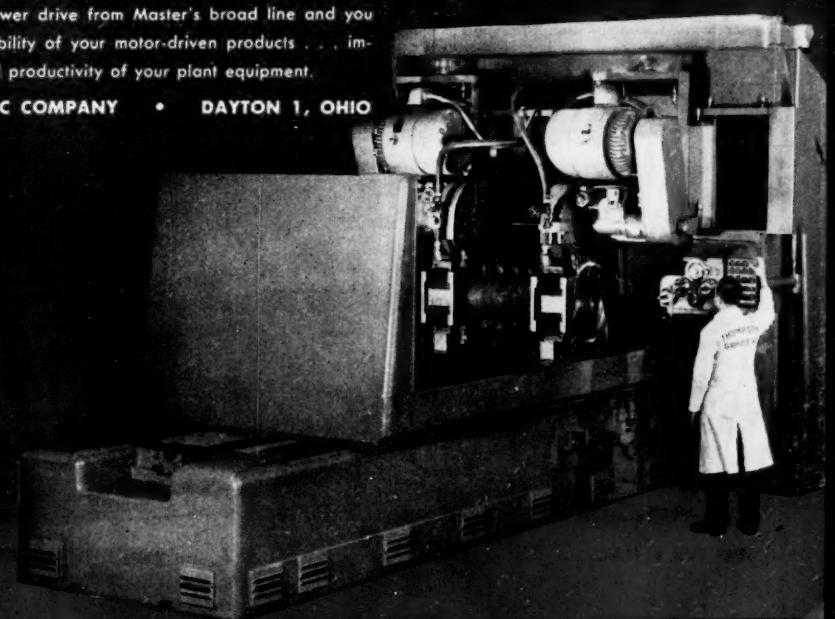

"The lowest-cost gate valve we have ever used!"

. . . that's what they say about the

LUNKENHEIMER "King Clip" Gate Valve

THE first clip type valve was originally developed many years ago by Lunkenheimer and was one of the most popular gate valves ever designed. As service demands became more severe, the basic design was improved into the present "King-Clip". Twenty-one different patterns are now available for a wide range of service conditions in virtually all industries.

The "King-Clip" is truly the leader of all clip type valves . . . it offers you a money saving solution to many valve problems. See your Lunkenheimer Distributor. He has a stock available to serve you promptly. Write for Circular No. 561.

There are good reasons why so many valve users prefer "King-Clip" Valves. *Note these features:*

Exceptionally strong body and bonnet construction.

Extra length pipe threads for a strong, safe joint.

Sharply tapered disc seats tightly.

Large, unobstructed channels really drain the bonnet.

Coarse stuffing box threads provide greater resistance to corrosion and stripping . . . reduce annoyance of leaky stuffing boxes.

Easy to disassemble and reassemble.

Exceptionally low maintenance cost.

In bronze mounted patterns, rolled-in seat rings, integral non-corrodible stem thread bearing and special alloy stem assure longer life.

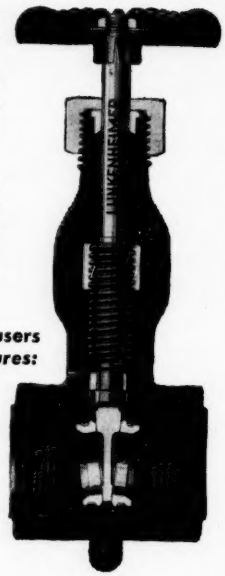

Fig. 1640 Iron Body Bronze Mounted . . . for steam, oil, gas, air, water and gasoline service.

Fig. 1644 All Iron . . . for handling solutions which attack bronze.

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"QUALITY"

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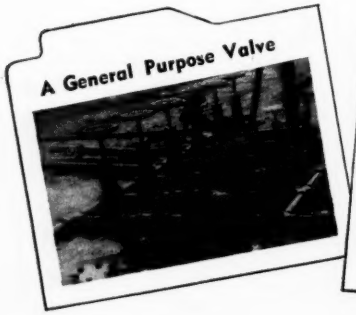
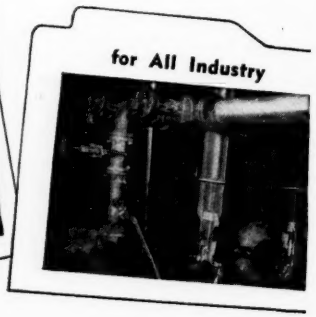




Catalogs, Bulletins

range, and chemical stability, in addition to good detergent, wetting and emulsifying action are characteristics of Nytron cleansing agent detailed in 4-page folder.—*Solvay Sales Div., Allied Chemical & Dye Corp., 40 Rector St., New York City 6.*

Paper Bottle

"Leak-proof" paper bottles with tapered design for nesting, and automatic filler-sealer are featured in information sheet.—*Illinois Creamery Supply Co., 713-19 S. Damen Ave., Chicago 12.*

Lagging Adhesive

For cover finishing on steam and hot water lines, feed water heaters, boilers and storage tanks and cold water lines, synthetic resin emulsion is suggested in 4-page Bulletin 11-17, which includes description, directions for use, and citation of laboratory and vermin tests.—*Arabol Mfg. Co., 110 E. 42 St., New York City 17.*

Miscellaneous

Portable Power Tools

Electric hammers, drills, screw drivers, grinders and sanders are among portable power tools illustrated and described in Catalog 486.—*Syntron Co., Homer City, Pa.*

Radioactive Tracers

Bibliography of industrial uses of radioactive tracers is presented in 14-page booklet with abstracts. Survey articles and those dealing with specific fields are listed separately.—*Arthur D. Little, Inc., Memorial Dr. & Kendall Sq., Cambridge 42, Mass.*

Corrosion-Resistant Alloys

High silicon iron alloys are covered in 12-page Duriron and Durichlor booklet. Histories of products and detailed list of corrosives to which products are impervious are given.—*The Duriron Co., Inc., 17 E. 42 St., New York City 17.*

Laboratory Furnaces

Temperatures ranging from 200-1,750 deg. F. may be set and maintained in small laboratory furnace described in information sheet.—*Schaar & Co., 754 W. Lexington St., Chicago 7.*

Food Equipment Catalog

Comprehensive lines of various supplies and equipment are illustrated and described in 120-page Catalog 1903.—*Creamery Package Mfg. Co., 1243 W. Washington Blvd., Chicago 7.*

Yeast In Nutrition

Therapeutic and nutritional properties of major vitamin B complex factors in yeast are given in *Dried Yeasts and Their Derivatives*, Vol. 1, No. 2.—*Anheuser-Busch, Inc., St. Louis 18, Mo.*

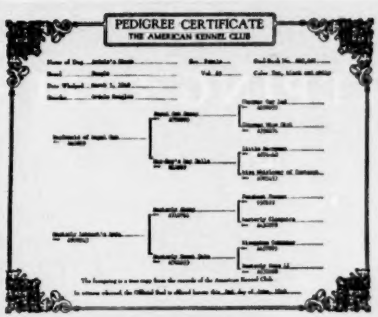
Laboratory Equipment

Neoprene-coated tube racks and baskets, a vacuum pump, water demineralizer, and rigid and flexible transparent instrument covers are among items featured in 16-page May issue of monthly lab supplies booklet.—*Schaar & Co., 754 W. Lexington St., Chicago 7.*

Refractometer

Refractive indices of liquids and solids measured by transmitted or reflected light may be obtained with Bausch & Lomb Abbe-56 refractometer described and illustrated in 8-page folder.—*Schaar & Co., 754 W. Lexington St., Chicago 7.* —*End*

THE BEAGLE is always ready for the hunt. He is accustomed to hunting in a pack and when in action waves his tail gaily and obeys all commands quickly and cheerfully. Beagles should stand no higher than 15 inches.



In Boxes, too

The Pedigree is Assurance of Thoroughbred Stock

A "PEDIGREED BOX" results from integrated production, with quality control by one management from timber to finished box.

That's why American Sugar Refining Company uses Union boxes to provide safe packaging for Domino sugar from refinery to dealers' shelves.

75 years of undisputed leadership in paper packaging goes into Union boxes. Tremendous forest resources feed five of the largest paper machines in the world, in a completely integrated pulp-to-container plant unmatched in America for size and production. And four modern box plants, strategically located, serve you promptly and dependably.

Add all these *extra* assurances of consistent quality, dependable service and fair price and it's easy to see why every month more makers of national brand products are shipping in Union boxes.

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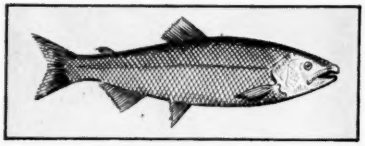

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New Technology

DAIRY

Tyramine in Cheddar Cheese

Use of both commercial lactic and *S. faecalis* starters in high-quality pasteurized milk produces cheese with more tyramine and good, typical Cheddar flavor than either of these starters used alone.

This was indicated by experiments in which high-quality pasteurized milk was divided into three lots and cultured with: (1) 2 percent lactic starter; (2) 2 percent *S. faecalis*, (3) 1 percent lactic and 1 percent *S. faecalis*. Rennet was added without giving starters time to develop, and the milk was made into cheese. It was then vacuum packed (20-22 in. vacuum) in 1-lb. tin cans and cured at 40, 50 and 60 F. for periods up to 1 yr. Flavor scoring was discontinued after 6 months.

Cheeses made from lactic starter alone were mild in flavor at the end of 4 months, but after 6 months at 50 and 60 F. flavor of medium intensity developed. Tyramine content remained low — 37 γ/g. after 1 yr. at 60 F. *S. faecalis* starter produced very little tyramine or flavor in 6 months at 40 F. When cured at 50, tyramine content was 108 γ/g. and flavor was medium, and at 60, tyramine content was 315 γ, flavor medium +. Cheese made with the two starters contained 85 γ/g. tyramine after 6 months at 40 F., 425 γ at 50, and 1,172 γ at 60. Flavors were: Mild +, medium +, and sharp —, respectively.

Digest from "The Influence of Temperature of Ripening on the Tyramine Content and Flavor of American Cheddar Cheese," by A. C. Dahlberg and F. V. Kosikowsky, *Journal of Dairy Science*, 316-21, April, 1949.

CONFECTIONERY

New Chocolate Process

Grinding all of the dry ingredients of chocolate, including cacao nibs, in a single operation without liquefying the nibs, is the basis of a patented process. The operation is accomplished by controlling conditions of roasting the nibs, their moisture content, and the temperature and humidity of the atmosphere in the pulverizer housing. The product is a fine powder, 99 percent of which will pass a 325-mesh screen, with no particle larger than 25 microns in size.

The pulverizer, a standard apparatus known as the Mikro-Atomizer, separates and recirculates the ground particles, retaining the larger ones as long as necessary for reduction to required size. To maintain desired conditions of temperature and humidity inside the pulverizer, it is enclosed in a casing supplied with conditioned cooling air. Temperature is held at a level at which the cacao nibs will not melt. Development of gumminess is further prevented by the relatively coarse contents of the mix, such as sugar and salt, which exert a scarifying and abrading action on the nibs previously dried in the roast to a moisture content of not more than 3.8 percent. The process eliminates multiple grinding and other procedures heretofore necessary in the treatment of nibs, and effects a saving of time and increase in output.

Digest from U. S. Patent 2,465,828, issued Mar. 29, 1949, on an application dated May 19, 1947, to J. J. Alikonis, assigned to Paul F Bleich Co., Bloomington, Ill.

BAKING

Heat Treatment of Milk Solids Improves Loaf Volume

Studies have been made of the effect of heat-treated casein, serum protein, and lactose on loaf volume and physical properties of doughs. Also investigated was the relation of time and temperature of heating skim milk to the baking behavior of nonfat milk solids prepared from it.

Each of the three fractions was heated to 70, 75, and 80 C. Spray-dried nonfat milk was prepared from separated milk that had been preheated to different temperatures by three methods.

When incorporated into doughs in amounts equivalent to 6 percent of nonfat solids, the unheated control fractions all depressed loaf volume, lactose having the greatest effect. In the absence of potassium bromate, heat treatment improved the baking quality of serum proteins, but had no effect on the baking behavior of casein or lactose. Inclusion of bromate increased loaf volume when unheated serum proteins were added; bromate also improved baking results with lactose.

Inclusion of either nonfat solids from skim milk or unheated serum proteins softened dough on prolonged mixing, increased extensibility, and lowered resistance to extension. Heat treatment overcame these effects. Improvement in the baking quality of separated milk was found to be a function of both time and temperature of heating, indicating that denaturation of the serum proteins is the biochemical reaction involved.

Digest from "Effect of Heat Treatment of Separated Milk on the Physical and Baking Properties of Doughs Enriched with Dry Milk Solids," by R. A. Larsen, R. Jenness and W. F. Geddes, *Cereal Chemistry*, Vol. 26, 189-200, May 1949.

VITAMINS

New Synthetic Vitamin

Preparation of a new synthetic vitamin A, tentatively called vitamin A-3, and potency tests on it have been announced. The tests indicated that the synthetic vitamin A has as much growth-promoting activity for young rats as the natural vitamin, and that it is as safe as the natural product inasmuch as it is biologically analogous to it.

During the testing the startling effect on bone growth of tremendous doses of vitamin A was observed. Fractures of long bones appeared in a few days where the deposition of new bone was unable to keep pace with accelerated absorption of bone for reshaping processes.

(*New Technology Continued*)

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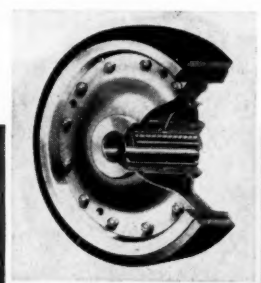

A SAVING AT EVERY TURN

Synthetic vitamin A-3 differs from natural vitamin A in its remarkable stability toward acids, and may therefore be useful in pharmaceutical preparations, such as multiple vitamin capsules, where large excesses of vitamin A must now be used to allow for its partial destruction by the strongly acidic constituents of the capsules.

Digest from papers by Dr. H. M. Wuest, Dr. N. Ercoli, Otto Schwarzkopf, H. J. Cahnmann, A. D. Lewis and J. Swidinsky at meeting of American Chemical Society, San Francisco, March 28, 1949.

MEATS

Protective Coating For Frozen Meats

A new coating for frozen meats is disclosed in a recent patent. Instead of using the customary beef caul fat, the inventors prefer an emulsion of oleo stock, gelatin, and flour, which is applied to the meat after it has been frozen. Function of the flour is to prevent the meat from sticking to the roasting or frying pan during the cooking operation.

In practice, the frozen meat is dipped into the emulsion, when it is about 110—160 F. Successive coatings provide the needed thickness on the finished product. Edible color and an antioxidant may be added to the emulsion.

Digest from U. S. Patent 2,462,760, issued Feb. 22, 1949, on an application dated Nov. 8, 1944, to H. S. Mitchell, L. E. Kay, A. S. Hartanov and J. M. Ramsbotton, assigned to Swift & Co., Chicago.

PACKAGING

Metal Containers for Food

Satisfactory containers for foods or other substances must prevent leakage out or in, be sufficiently strong to withstand processing and transportation strains, not react chemically with their contents, take external coatings for protection or identification, and be reasonably easy to open.

Non-leakage of dry solids is easy to obtain, but complete protection against gas or liquid leaks is difficult. Surface tension and viscosity both play a part. A seal that is impervious to water may pass organic solvents or even a 40 deg. sirup which has a lower surface tension than water. It may, however, hold a 60 deg. sirup in which the increased viscosity balances low surface tension.

Testing of cans by admitting air at 2½ lb. pressure and observing them for leaks can be useful if the amount of leakage is correlated with can

(*New Technology Continued*)

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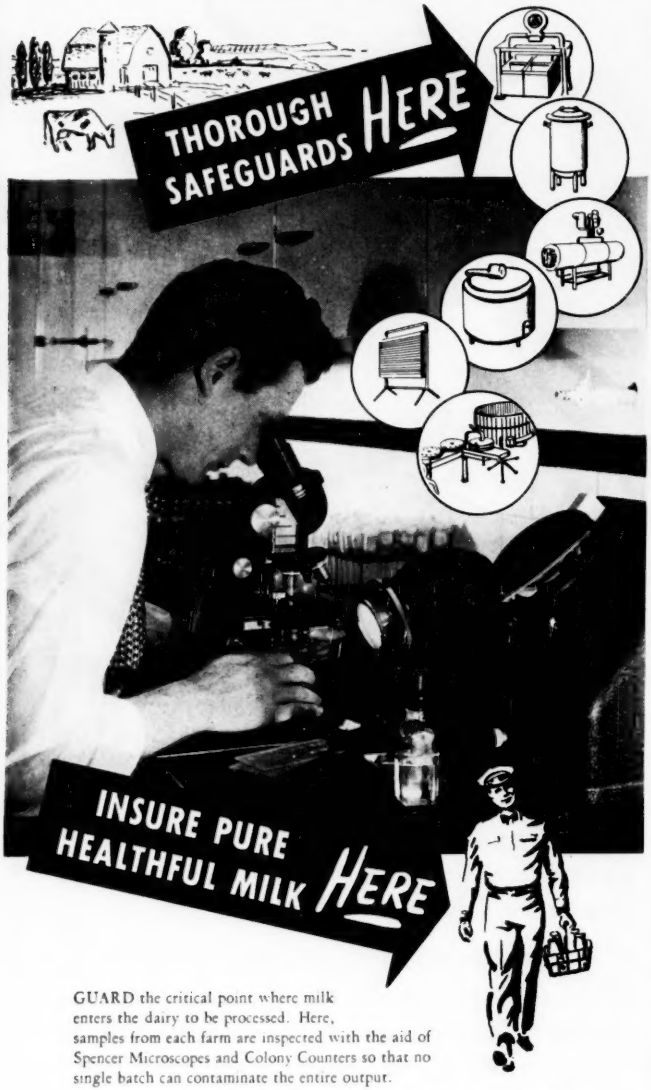

GUARD the critical point where milk enters the dairy to be processed. Here, samples from each farm are inspected with the aid of Spencer Microscopes and Colony Counters so that no single batch can contaminate the entire output.

Be sure your laboratory has modern, efficient equipment to match the high standards set elsewhere in your dairy. New Spencer Microscopes offer many advantages to help your technicians do a thorough job—improved optical performance, convenient adjustments, newly-designed attached light sources if desired. The new Spencer Darkfield Colony Counter has improved illumination that increases counting accuracy and reduces operating fatigue.

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changes in actual service. For example, cans for nitrogen packing of dehydrated foods with less than 2 percent oxygen, should be rejected if leakage of air at 2½ lb. pressure is greater than 1 ml. per min. Smaller leaks are acceptable.

Cans sealed under vacuum cannot be tested by the pressure technic, though leaks are no less important. A leak of 0.0001 ml. per min., which cannot be detected by visual means, will eventually destroy a 20 in. vacuum. Bacteria are known to find their way into cans of food through seals capable of holding 60 lb. pressure in swells. It is believed that they penetrate the seal when the seam changes its shape during cooling as the ends of the can flip from convex to concave. If this takes place in a water cooling bath, sufficient contaminated water may enter the can to infect the contents. Chlorinated cooling water is known to reduce the incidence of this kind of infection.

Both aluminum and tinplate cans can be made amply strong by controlling the composition and hot or cold working of the metals. Corrosion of aluminum may be a problem with acid-containing packs but can be controlled by use of alloys, anodizing, or lacquering. Tinplate suffers less from internal corrosion if its base metal is a low phosphorus steel.

Digest from "Some Aspects of Packaging in Metal Containers," by R. K. Sanders, *Chemistry and Industry*, 151-55, March 5, 1949.

Frozen Food Warning Device

Designed to inform the buyer whether a package of quick-frozen food has been thawed in the interval between quick-freezing and time of purchase, a warning device integral with the package has recently been patented. Crux of the invention is the development of visible color in the device if thawing has occurred.

The device comprises a casing of synthetic resin of such shape as to be easily inserted into the food mass, and of such length that its inner point is substantially at the center of the food mass. Within the casing is a moisture-absorbent wick and a capsule of water. The wick is in contact with a chemical placed under a transparent window at the top of the casing. On quick-freezing, the water capsule bursts, leaving the ice free to melt and saturate the wick if thawing occurs before purchase. The wick carries the moisture to the chemical at the transparent window and causes a color to develop.

Potassium permanganate and an-

(New Technology Continued)

For 45 years, Stange has been creating outstanding seasonings for the proudest names in America's food industry. Let Stange's years of experience and seasoning "know how" help you make *your* brand name a *buy* word!

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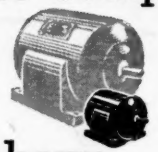
Chicago 12, Illinois Oakland 6, California

Since 1904

"SILENT PARTNERS IN FAMOUS FOODS"

. . . proper lubrication of conveyor chains with Oakite Composition No. 6 cuts  power costs

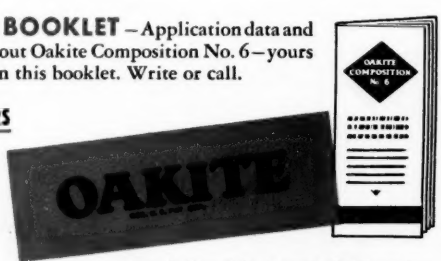
read how:

OAKITE COMPOSITION No. 6 penetrates and lubricates link pins to assure free-flexing of chains around sprockets. Providing proper slippage, it reduces gate pressure . . . cuts down drag on motors and thus conserves power. To be specific:

ONE ENGINEER ran a test with an ammeter on a 3 hp motor which drove a 50 ft. double case conveyor. Before using Oakite Composition No. 6 to lubricate chains, this motor drew 8 amps at 220 volts and ran so hot that the overload switch would continually kick out. Since Oakite Composition No. 6 and the Oakite Chain Lubricator have been used, the motor draws only 6 amps . . . runs cool. Savings in electricity per month on one motor alone is $1.80. Doesn't seem much at first glance, but amounts to approximately $18.00 per month on the ten motors in use. In yearly savings that represents $216.00 when all chains are lubricated with Oakite Composition No. 6.

PAYS FOR ITSELF. Besides power savings, this Oakite lubricant also reduces motor burn-outs . . . saves wear and tear on chains. So, Oakite Composition No. 6 pays its own way. Trough or drip method of application easily installed. No equipment downtime. Your nearby Oakite Technical Service Representative will show you how. Call him.

FREE BOOKLET – Application data and facts about Oakite Composition No. 6 – yours FREE in this booklet. Write or call.



OTHER OAKITE CLEANERS

- Oakite Compound No. 32 removes scale, rust, without harming metal.
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Specialized Industrial Cleaning

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hydrous copper sulphate are cited as suitable chemicals. By an alternative method, the wick itself may be saturated with a chemical having no appreciable color when dry, but noticeable when wet, for example alkaline phenolphthalate.

Digest from U. S. Patent 2,460,215, issued Jan. 25, 1949, on an application dated July 8, 1946, to Kenneth J. Chase, Wilmington, Mass.

QUALITY CONTROL

Approve Method of Checking Tenderometer Readings

Raw peas, selected for uniformity and preserved in alcohol, have been approved by the National Canners Association as a dependable medium for comparing tenderometer readings. The decision follows extensive study of the method developed by J. Swenholt, Birds Eye-Snider Div., General Foods Corp. In collaborative tests by the Association on its own tenderometer and 21 others located in 7 states, results ranged from 4 to 11 points, average 8.1 points, which is close to the variation in fresh peas. The standard deviation in 21 tests varied from 1.37 to 3.78, average 2.5, which is close to the average 2.4 obtained with fresh peas.

Standard procedure has been adopted for preparation of peas-in-alcohol, and the manufacturer of the tenderometer, Sprague-Sells Div., Food Machinery and Chemical Corp., will offer the product to all owners of tenderometers for the 1950 canning season. It will also set aside a standard reference tenderometer on which it will test the peas just prior to shipment, and mark the container with the standard reading. Instructions will be sent for adjusting tenderometers to bring them into agreement with the reference machine.

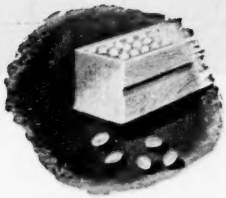
Digest from "A Procedure for Checking Tenderometer Readings," by C. J. Tressler, National Canners Association Research Laboratories, Washington 6, D. C.

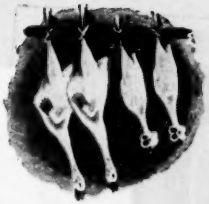
Moisture Meter for Grain

Electrical moisture meters for grains or other dry products are not new, but most of them depend on measurements of dielectric constant by methods requiring complex circuits and accurate indicating instruments.

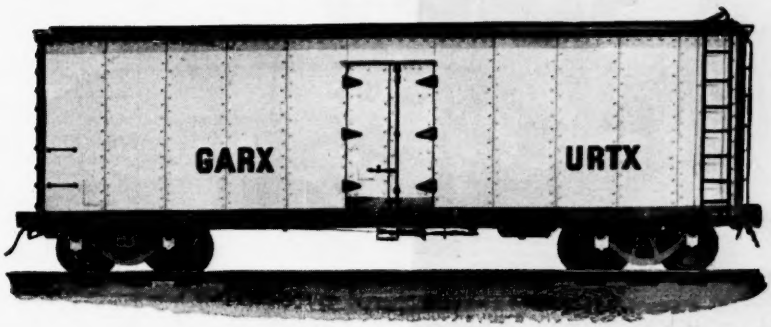
A meter with a simple circuit requiring only a single electric eye-type tube, called the G.R.L. meter, has been designed in the Grain Research Laboratory at Winnipeg. A 190g. sample of wheat, for example, is placed in

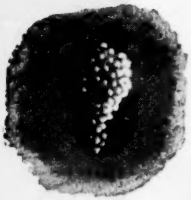
(New Technology Continued)





Along with many other specialized types of General American cars, this refrigerator car serves the nation's shippers.





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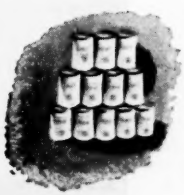
To serve you further, General American representatives located in most major producing areas are ready to help you solve your own individual shipping problems quickly and economically.

So whatever and wherever you ship, you may take advantage of General American's 50 years of experience serving the nation's shippers. And you may rely absolutely on General American's outstanding reputation for complete dependability.



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the hopper of the instrument and allowed to drop into the measuring cell under standard conditions of packing. It thus becomes the dielectric of a condenser and its dielectric constant is a function of the moisture content of the grain. The dial readings of the instrument are converted to percentage by reference to a chart prepared from measurements on 159 samples made by both instrument and vacuum oven moisture determinations.

The instrument, in spite of its simplicity, was found essentially equal to other dielectric type instruments and was surpassed only by instruments measuring resistance.

Digest from "A Simple Meter for Estimating the Moisture Content of Grains," by H. E. Rasmussen and J. A. Anderson, *Canadian Journal of Research*, Vol. 27F, 249-52, May 1949.

FERMENTATION

Woody Flavored Beer

Draft beer in wood barrels is sometimes said to have a "woody" or musty flavor. Since *Actinomyces* species in artificial culture produce a characteristic unpleasant earthy smell, attempts were made to isolate actinomycetes from "woody" beer. These attempts met with no success, since beer has a pH of 3.8-4.2 and the organisms flourish at pH 6.8-7.0.

On culturing chips or shavings from casks in which beer had acquired the off flavor, actinomycetes were obtained after 12 days at 80 F., in three out of four casks examined. Further search for the source of infection showed that the organisms could be obtained from brushes on the cask-washing machine, as well as from other locations in the cask-washing yard. The woody flavor could be imparted to beer by placing it in casks that had been deliberately infected with such *Actinomyces* species as *Streptomyces griseus*.

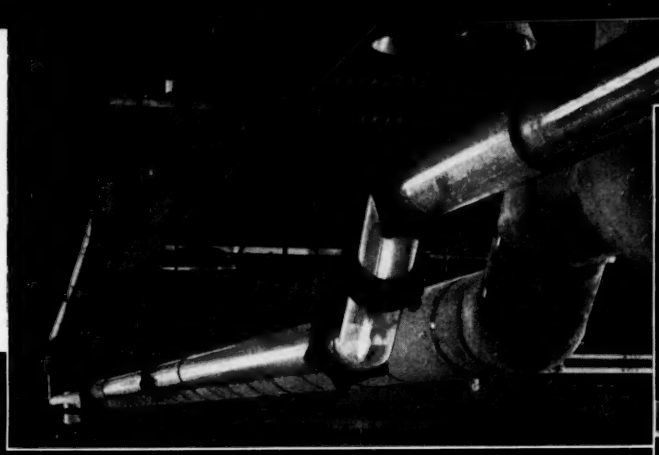
The flavor is very difficult to remove from casks by ordinary washing procedure. Even a double washing may be insufficient.

Digest from "Woody Flavours in Draught Beers," by B. M. Brown, E. C. Barton-Wright and A. I. L. Lyon, *Journal of the Institute of Brewing*, Vol. 55, 100-3 March-April, 1949.

Wine Technics

Blending and aging technics have been proposed to enable California wine makers to capture the rare flavor of fine Spanish sherry. It is believed that California sherries can be improved by making the wine from palomino grapes, fortifying it and allowing it to settle, racking off the clear

(New Technology Continued)



THOUSANDS OF FEET OF PYREX *brand* Glass Pipe

Guard *Bercut-Richards Food Products*

Some idea of the extent to which PYREX brand glass pipe has been utilized in the Bercut-Richards Packing Co. is shown in photos above. Note method of coupling glass to metal pipe lines.

Bercut-Richards Packing Co., one of California's packers of quality foods, uses PYREX brand glass pipe wherever possible. Here is their own experience with it.

"Several thousand feet of PYREX brand glass pipe are utilized to transfer pulped fruit and vegetables to preheaters and from finishers to the can filling machines. These glass lines have been in use for three seasons. There has been no maintenance problem in their use. The benefits we derive may be summarized as follows:

1. **Sanitary, easy to inspect clean up job at end of shift.**
2. **Removes danger of metallic contamination which may affect color, flavor and vitamin content.**
3. **Operators can determine rate of flow at a glance and take steps to adjust flow to operations.**
4. **Impaired flow, resulting from pump failure, is easy to spot.**
5. **There is less chilling of heated juice passing through glass lines.**
6. **Improper color, resulting from either processing or contamination from defective machine operation, is easily detected."**

***T. H. Richards, Jr.,** Vice President*
BERCUT-RICHARDS PACKING CO.
Sacramento, Calif.

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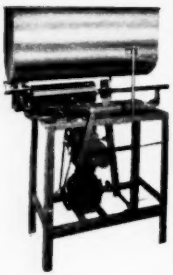

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. . . of his buying know-how

Mr. R. Hockman, shown above, is only too happy to tell the "secret" of how a regular McGraw-Hill service helps him in his job.

Mr. Hockman is Manager, General Labs, Section, of the Kroger Food Foundation of Cincinnati, Ohio. As such, he is in constant need of specific buying information on food processing machinery, equipment, supplies and services.

He solves his buying problems by using McGRAW-HILL'S PRE-FILED FOOD INDUSTRIES CATALOGS—a completely indexed collection of manufacturers' catalogs.

Mr. Hockman says: *"FOOD INDUSTRIES CATALOGS is an excellent source of information."*

This helpful catalog is published and distributed by the McGRAW-HILL CATALOG SERVICE, 330 West 42nd Street, New York 18, N. Y.

juice, and baking it for 4-5 months at about 120 F. The wine should be racked in the cellar for clarification and aging for a year after being standardized for acid and sugar. Then it should be placed in Spanish type sherry butts and exposed to extremes of weather for 2 yr. or more.

Another suggestion is that more sparkling clear wine can be made if grapes are first treated with a chemical that digests cloudy pectin. The digestive chemical, known as pectic enzyme, is produced by fungi, and will increase the yield of grape juice by 7 percent. It can also be used to extract coloring matter from grape skins in the manufacture of ruby port.

Digest from papers by E. M. Brown, M. S. Nightingale, J. H. Kilbuck, F. Nussenbaum and W. V. Cruess at meeting of American Chemical Society, San Francisco, March 29, 1949.

ENGINEERING

Dough Sheeting Machine

For continuously forming a sheet of yeast-type dough, apparatus which incorporates pressure discharge and an elongated throat to prevent swelling or ballooning due to pressure, has recently been patented.

The sheet is formed from a plurality of dough masses, each in a separate sealable reservoir. Reservoirs are assembled as a unit and have hopper-type bottom closures with dough outlets separately registerable with the elongated throat. Means are provided for applying air or an inert gas, under pressure, to each dough mass. Heated air may be applied to one or both sides of the extruded sheet of dough to form a slight crust. Different die throats may be used to obtain sheets of various thicknesses and widths.

Digest from U. S. Patent 2,456,371, issued Dec. 14, 1948, on an application dated Sept. 16, 1943, to John Buechek, Kokomo, Ind., and assigned by mesne assignment of one-half to American Bakers Machinery Co., St. Louis, Mo.

MISCELLANEOUS

Combustion Properties Of Ethylene Oxide

Explosions of ethylene oxide during fumigation of dried fruit have led to a study of combustion characteristics of the vapor. Examination of effect of pressure on the spontaneous ignition temperatures yielded results similar to those for acetaldehyde.

Effect of pressure on flame propagation in mixtures of ethylene oxide and air were observed in a closed glass tube 5 cm. in dia., using hot-wire igni-

(New Technology Continued)

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—spices to grinding mills

—salt on potato chips

—coffee to driers

—pickles to picking tables and numerous other spots in food processing

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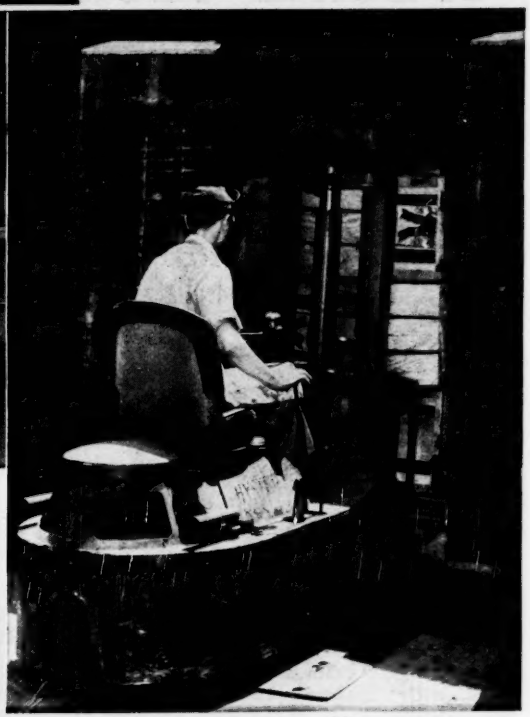

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HEAVY DUTY INDUSTRIAL TYPE PNEUMATIC TIRES give the Hyster "20" greatly increased traction, ramp climbing ability, cut down on floor and paving repair and maintenance costs, make higher truck speeds more practical and safer, are easy on the load and driver — EITHER INDOORS or OUTDOORS.

HYSTER "20" HAS GREATER MANEUVERABILITY because of Hyster's patented turning counterweight around the trunnion mounted rear steer wheel; low center of gravity which increases stability; easier steering, rounded rear end.

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- ✔ Pneumatic tires.
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- ✔ Maximum operator visibility.
- ✔ Load-Grab — For handling many loads without pallets.
- ✔ Special Load-Grab arms available for handling bales, boxes, bundles, bags, barrels, oil drums — without pallets.

Hyster's 7 models range from 2,000-lb. to 30,000-lb. capacity. All are equipped with pneumatic tires.

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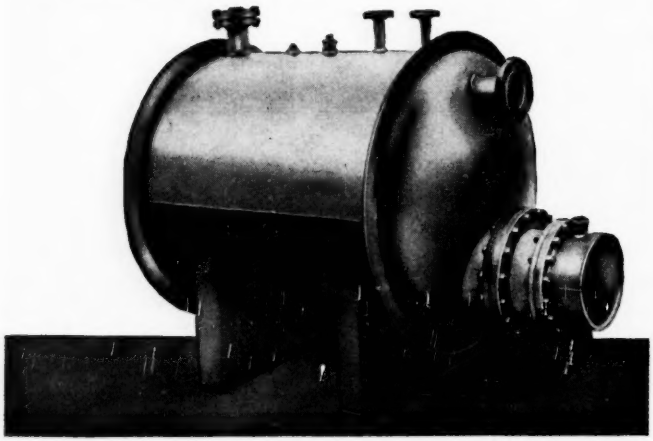
KEEPS IRON PICKUP TO A MINIMUM ON THIS NICKEL CLAD JOB . . .



The above photo is of a storage type cooler for a synthetic rubber plant. The coil is of solid nickel, as is the tube sheet. The vessel itself is constructed of nickel clad steel. Careful technique of welding rod, sequence of welding and weld preparation, all are used to reduce iron pickup in the nickel portion of the weld. After completion the welds are meticulously inspected and chemically tested to make certain iron pickup does not exceed suitable values. We of DOWNINGTOWN solicit your inquiry for *heavy duty shell and tube equipment:*

Alloy materials, including aluminum, inconel, nickel, phosphor bronze, or welded copper. Many of these are welded by Heliarc.

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Special stainlesses, for difficult service conditions.

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Modern facilities available for checking of welding operations by X-ray.

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HEAT EXCHANGERS

tion. With the tube vertical and ignition at the lower end, continuing flame propagation can occur at atmospheric pressure in all mixtures containing more than 3.6 percent ethylene oxide.

With increasing proportions of the combustible, the flame changes from nonluminous to luminous and at about 68 percent, a normal upper limit flame is produced. Beyond this point, the flame becomes pale blue and continues thus as long as any air is present in the mixture. In the absence of air, ethylene oxide propagates an even less luminous blue decomposition flame: but propagation is at a higher speed and there is greater pressure increase.

At reduced pressures, the decomposition flame is propagated down to 630 mm. pressure; but below this an upper limit for ethylene oxide-air appears and the flammable range is narrowed, being finally eliminated at about 70 mm. A graph in the original article gives further details.

Digest from "Ethylene Oxide Explosions," by J. H. Burgoyne and F. A. Burden, *Nature*, Vol. 162, 181-82, July 31, 1948.

Plastic-Coated Eggs

Coating egg shells with plastics has been found effective in preventing loss of moisture and CO_2 in storage of both whole and cracked eggs. Polyvinyl acetate, polystyrene, and chlorinated rubber were tested, both unmodified, with dibutyl phthalate and n-butyl stearate plasticizers. Plasticized coatings were also modified by the addition of petrolatum and microcrystalline wax. Plastic concentration was 10 percent by weight in appropriate solvents.

Fresh, infertile eggs were individually immersed in the plastic solutions for 2 sec. and dried on a wire rack for 1 min. or slightly more, depending on the nature of the solution. They were then individually weighed and stored for 10 days in an incubator at a temperature of 99.5 F. and 35 percent relative humidity. Each egg was again weighed, and the pH of its dense albumen was measured.

All three plasties substantially reduced the loss of CO_2 and water compared with untreated eggs. The preservative action of polystyrene and chlorinated rubber was improved by addition of either plasticizer, and further improvement was noted when the plasticized resins were modified by the addition of small amounts of petrolatum and of microcrystalline wax. Cracked eggs were as effectively sealed as eggs with sound shells.

Digest from "Studies on Preservation of Shell Eggs by Coating with Plastics," by W. D. Yushok and A. L. Romanoff, *Food Research*, Vol. 14, 113-22, March-April, 1949. —*End*

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TOWER PNEUMATIC HOSE

For standard working pressures —in sizes from 3/8" to 1-1/2" inside diameter.

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Eliminate Guesswork with TOWER HOSE for your pneumatic tools

"You can quickly recognize the high quality of Tower Pneumatic Hose," says Mr. Alcott, pictured above. Republic's strong braided cord plies, impregnated and imbedded in resilient rubber, provide a strong wall to withstand high pressures. As the hose is dragged from place to place a tough, resilient brown cover resists cutting, abrasion, and wear. The tube, specially designed, resists damages of heated oil from compressors. You will find Tower Pneumatic Hose on pneumatic tools in factories, foundries, railroads, shipyards, mines, quarries and on structural work throughout the world.

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Big *NEW* advantages in America's most popular multi-stop delivery truck!

360 cubic feet of payload space in NEW 12-foot Metro* body

International Model KB-5-M, larger version of the unchallenged 11-year leader in the extra-capacity multi-stop delivery field, offers up to 360 cubic feet of loading space. Its payload compartment is 144 inches long, 70 inches wide, 67½ inches high. Its International Green Diamond Engine mounted in the 135-inch wheelbase chassis develops 93 brake h.p. and is capable of meeting hauling requirements up to 12,000 pounds GVW.

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There are 3 sizes of International chassis with Metro bodies to assure you the right truck for your delivery job. *KB-1-M*, payload space 225 cubic feet, 7¾ feet long with a GVW rating of 5,000 pounds; *KB-3-M*, payload space 280 cubic feet, 9½ feet long with a GVW rating of 7,000 pounds; *KB-5-M*, payload space 360 cubic feet, 12 feet long with a GVW rating of 12,000 pounds.

*Metro. Registered trade mark of The Metropolitan Body Company, Inc., subsidiary of the International Harvester Company.

NEW International multi-stop chassis simplifies economical mounting of special bodies

International chassis with Metro front-end sections are available ready for mounting custom-built bodies. Each front-end section includes windshield, front-quarter windows, dash, engine housing, and driver's seat. 3 chassis sizes: wheelbases—102, 113, and 135 inches; GVW ratings—5,000, 7,000, and 12,000 pounds.

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INTERNATIONAL TRUCKS

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Books

Water Problems

WATER SUPPLY ENGINEERING. *By Harold E. Babbitt and James J. Doland. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.,* 1949. 637 *pages;* 6½x9¼ *in.; cloth. Price,* $6.50.

Where a food plant's water supply is a major engineering problem, this book should be a valuable asset. The volume represents a thorough revision of earlier editions, with greater emphasis upon practical applications to problems, and less on theoretical design.

Plant engineers should be able to utilize the information in at least 22 of the 31 chapters. The illustrations, tables and formulas will also be of help.

Labor Relations Quiz

114 CHECK POINTS ON HOW TO PREVENT GRIEVANCES. *By Bleick von Bleicken and Carl Heyel. Published by The National Foremen's Institute, Inc., Deep River, Conn.,* 1949. 34 *pages;* 8½x11 *in.; paper. Price,* $1.

The food manufacturer, like every other large or small industrialist, has human relations problems. And very often they are not recognized in time for most satisfactory remedial action.

Presented here are so-called check points designed to raise questions to which top management should find answers. And if you can find a right answer to every question raised, you will have gone a great part of the way in preventing labor difficulties.

Citrus Technology

CITRUS PRODUCTS. *By J. B. S. Braverman. Published by Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y.,* 1949. 438 *pages;* 6x9 *in.; cloth. Price,* $9.

Here is a book that offers compact information on the chemical composition and technology of citrus products. It also offers practical results of the author's 25 years of factory experience in the utilization of citrus by-products.

Mr. Braverman has confined his efforts to a presentation of the most recent opinions, structural formulas, and new developments, with particular attention to details that are considered most important in the industry.

Chemical components are dealt with briefly in the first part of the book. Much more space is devoted to the chemistry of the changes that take place during and after processing. Space has also been found to describe the standard canning procedures used in the citrus industry.

More than 100 illustrations and tables are used to clarify, and thus emphasize, topics in the text.

Extra Costs

THE HIDDEN PAYROLL. *Published by Chamber of Commerce of the United States, Washington 6, D. C.* 32 *pages. Price,* 50c.

Summarized in this publication is a survey of representative private employers in a variety of different-size businesses. *Non-wage* labor costs of operation are identified, with the data showing additions of about 15 percent to the *direct-wage* bills in the average industry. Such information is important for both cost analysis and labor-management conferences.

Management Plans

THE FUTURE OF BUSINESS RESEARCH. *Published as a report of* 1949 *Economics Institute by Chamber of Commerce of the United States, Washington 6, D. C.* 110 *pages. Price,* $1.

Here is a report presenting the full texts of the major addresses made by six industrial executives who led a discussion of the Institute in Chicago, last February. These addresses offer features of importance in management planning, general business statistics, and market research.

Practical Refrigeration

REFRIGERATING PRINCIPLES AND PRACTICES. *By Norman Sharp. Published by McGraw-Hill Book Company, 330 W. 42nd St., New York City 18, 1949. 398 pages;* 6¼ *x* 9¼ *in.; cloth. Price, $4.*

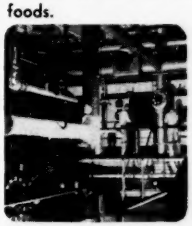
Books on refrigeration are coming along at a rate to fill every possible need. But few of them succeed in correlating the principles of refrigeration with practices as applied in the industry.

Following this method of presentation, the author first offers a review of the fundamental physics involved. He then discusses the refrigeration load, the chemical and thermodynamic properties of common refrigerants, the thermodynamic cycles and their use with different refrigerants. In accordance, the remainder of the book has been devoted to principles and practices as they closely relate to each other.

(Books Continued)

Big Plant at Nampa, Idaho, Makes 500 Tons of Ice a Day with Frick Refrigeration

And quick-freezes 5 tons of fresh foods per hour at another plant, 600 feet away! Five cold storage rooms hold 2500 tons of ice and 85 carloads of frozen foods.



Detail of the Excellent Machine Room

Seven large Frick ammonia compressors carry the cooling load. They were selected for this Terminal Ice and Cold Storage Co. plant by the Associated Refrigerating Engineers, Los Angeles consultants.

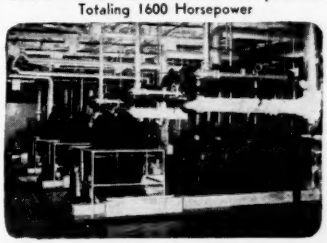
Frozen Foods are Stored at 10° Below Zero

You can specify Frick refrigerating, ice-making and air conditioning equipment with confidence. Let us submit estimates on the cooling equipment you need.

FRICK CO. WAYNESBORO PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery

Below: Five of the Seven Frick Compressors, Totaling 1600 Horsepower



New DAY Autoclean DUST FILTER

PROVIDES CONTINUOUS AUTOMATIC CLEANING FOR CONSTANT AIR FLOW

- High Air to Cloth Ratios
- Effectively Filters Through Felt
- Continuous Reverse Jet Cleaning
- Low Back Pressure

The New **DAY** "Autoclean" Dust Filter was designed primarily for industries requiring continuous automatic filtering with constant air volumes.

Actual installations are operating successfully with air to cloth ratios of 15 or 20 to 1, and with back pressures of only 1 to 2 inches water gauge. Such performance is made possible by the type of filtering felt used, and the gentle, yet effective, continuous reverse jet cleaning.

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Check These Advantages

✓ ***CONTINUOUS CLEANING***—Low, constant back pressures result in uniform air volumes.

✓ ***CONTINUOUS OPERATION***—Reverse jet cleaning mechanism travels slowly up and down, blowing high pressure air back through the felt. This eliminates necessity of shutting down even part of the filter for cloth cleaning.

✓ ***PARALLEL AIR FLOW***—Dust laden air enters the plenum at top of filter. Air and dust travel together down through tubes toward continuous dust discharge below the tubes.

✓ ***ECONOMY***—Less filter required because: (1) higher air to cloth ratios are permissible; (2) no extra filter required to permit shutting off sections for cleaning.

Write-to-**DAY** for New "Autoclean" Dust Filter Bulletin.

The DAY Company

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Government Publications

CONSTRUCTION AND ARRANGEMENT OF MILK PLANTS. *By C. J. Babcock. U. S. Department of Agriculture, Circular No.* 800. *Price* 10c. Furnishes specific information about modern milk plants as an aid to those who wish to build new plants or to remodel old ones.

CHARTS OF COMPRESSIBILITY FACTORS AND CHARTS SHOWING QUANTITIES DELIVERED BY COMMERCIAL CYLINDERS FOR HYDROGEN, NITROGEN, AND OXYGEN. *National Bureau of Standards, Miscellaneous Publication* M191. *Price* 25c. Presents results of extensive investigations, and analyses of existing data. Two charts given for each of the gases, with examples of their use.

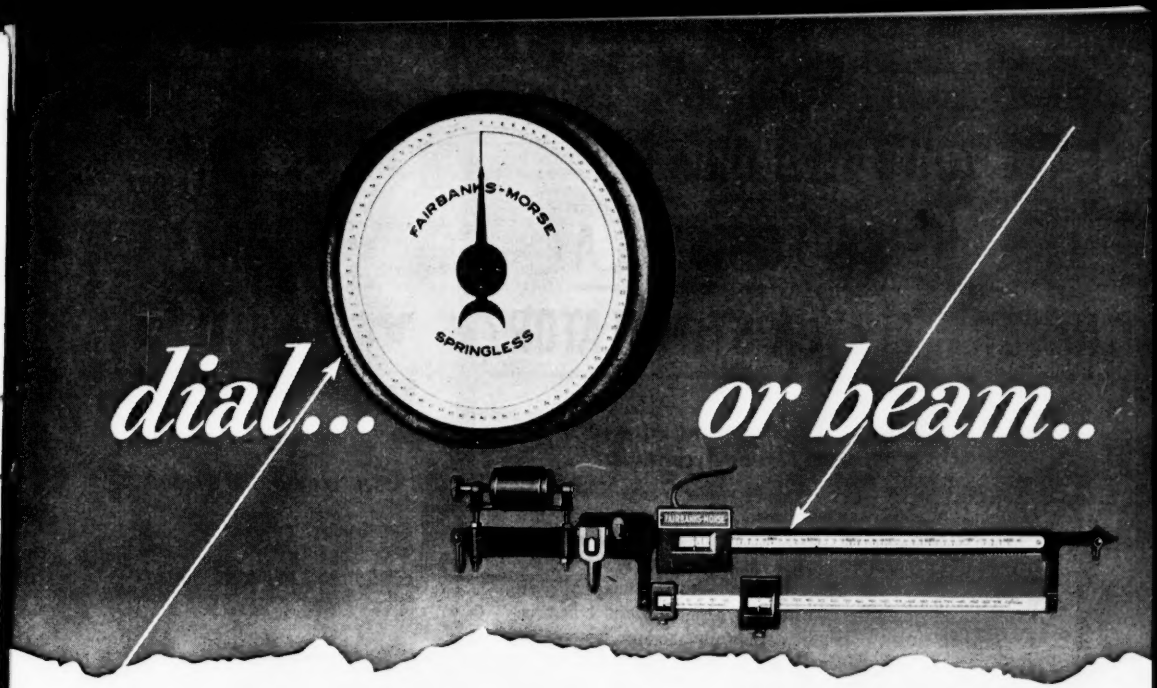
ANIMAL FIBERS USED IN BRUSHES. *By T. M. Plitt Hardy and John I. Hardy. Bureau of Animal Industry. Circular C-802. Price,* 10c. Covers types of commercial soft-brush and paint-brush fibers and summarizes their characteristics. Information is included on proper preservation of paint brushes.

YIELD AND COMPOSITION OF COTTONSEED AS INFLUENCED BY FERTILIZATION AND OTHER ENVIRONMENTAL FACTORS. *By W. H. Tharp, et al. Bureau of Plant Industry, Soils & Agricultural Engineering. Technical Bulletin T-974. Price* 30c. Discusses in terms familiar to the cottonseed industry and research workers the results of studies on fertilizers and other influences on cottonseed.

UNIFIED METHODS FOR THE ANALYSIS OF FATTY MATERIALS OF THE INTERNATIONAL UNION OF CHEMISTRY. *Translated from the French by Carroll L. Hoffpauir. Bureau of Agricultural & Industrial Chemistry. AIC-225. Available from Southern Regional Research Laboratory, New Orleans, La. Mimeographed.* Third Report of the International Commission for the Study of Fatty Materials.

FEDERAL SPECIFICATIONS INDEX. *Bureau of Federal Supply. Price,* 40c. The current list of Federal Specifications which constitutes Section IV of the Federal Standard Stock Catalog. Revised to January 1, 1949.

The above recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue. —End



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For all weighing operations, there is a Fairbanks-Morse Scale that exactly suits your requirements. Whether it is a Dial Scale or a Beam Scale, accuracy ... fast operation ... ease of reading ... long service ... are built-in Fairbanks-Morse advantages that provide the easy way to "weigh."

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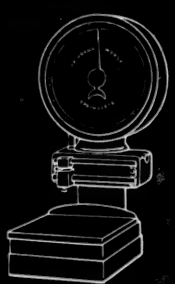
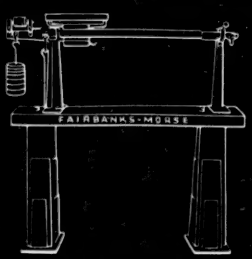
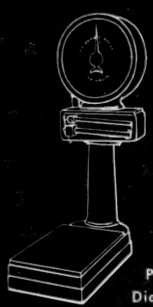


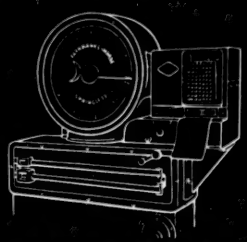
Bench Scale



Full Capacity Beam



Portable Dial Scale



Printomatic Dial Scale

HAVE YOU TRIED OR CONSIDERED USING A NATURAL FLAVOR STIMULATOR?

VEGAMINE . . . *How and Why It Is The Superior Flavor Accentuator*

● To produce VEGAMINE, wheat and soy protein are treated with hydrochloric acid under pressure. This breaks the protein molecules into 22 amino acids.

As such, proteins are not assimilable as foods; so, both animal and vegetable proteins which humans consume are broken down in a manner similar to our processing of VEGAMINE. Thus, VEGAMINE is valuable not only because it is a flavor accentuator, but is also a concentrate food element.

After the acid treatment, the digested material is filtered to remove the carbonized starches and fibers. Then, by adding soda the excess acid is converted to salt and the glutamic acid is converted to mono sodium glutamate. This liquid is then spray-dried to produce VEGAMINE —a light tan-colored powder.

In the conversion of proteins, 22 amino acids are produced. While mono sodium glutamate is an important amino acid salt, **the other amino acid salts have an indispensable value in flavor accentuation.** Thus, for many purposes, VEGAMINE—"unrefined mono sodium glutamate"—is not only cheaper but better!

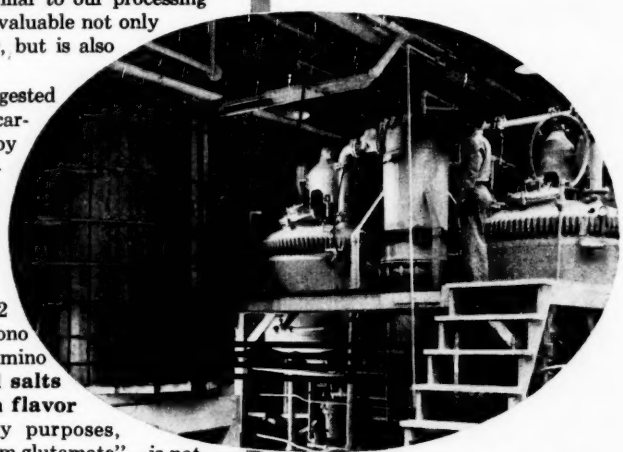
In the production of white, *tasteless* mono sodium glutamate, the glutamic acid is separated and then crystallized.

A residue of exhausted, digested protein remains and is often sold as a hydrolysate or vegetable protein derivative. Such products must be declared as "an artificial flavor."

VEGAMINE is the *complete* protein conversion—with nothing added, nothing removed. Try it to accentuate and sustain the flavor . . . and the flavor-popularity . . . of your products.

VEGAMINE

is not an artificial flavor and is to be declared on labels as "Unrefined Mono Sodium Glutamate" according to official U.S. F. & D. ruling.



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Patents

Liquid Materials Containing Calcium Compounds and Organic Fermentables Heated to Above 160 Deg. F. But Below Boiling Point With Addition of Precipitant for Calcium Compounds at pH 3 to 6 Preparatory to Separation of Precipitated Calcium and Subsequent Heating Under Pressure to Higher Than Boiling Temperature to Dissolve Suspended Organic Matter in Liquid From Prior Operations—*G. T. Reich, Philadelphia.* No. 2,464,611. Mar. 15, 1949.

Soft Foods Subjected to Wood Smoke Under Pressure to Agitate Mass and Impart Wood-Smoked Flavor—*T. A. Sala, Dallas, Tex.* No. 2,464,614. Mar. 15, 1949.

Substantially Fat-Insoluble Gallic Acid Ester Incorporated in Fatty Material by First Dissolving Ester in Relatively Large Proportion of Molten Lecithin and Then Adding to Fatty Material Likewise in Molten State—*L. A. Hall, Chicago, to Griffith Laboratories, Inc.* No. 2,464,928. Mar. 22, 1949.

Food Material Cut Into Elongated Strips by Mechanical Means Similar to Metal Working Lathe—*M. Ross, Los Angeles.* No. 2,464,993. Mar. 22, 1949.

Wheat Dried During Harvesting by Combine—*H. J. Demuth, Enid, Okla.* No. 2,465,070. Mar. 22, 1949.

Egg Meats Mechanically Broken Out of Shell While Being Conveyed on Endless Belt Designed to Hold Eggs in Fixed Row During Passage Under Knives to Cut Away Portion of Shell Preparatory to Being Inverted and Egg Meats Emptied Out of Shell—*P. M. Serbu, Willingdon, Alberta, Canada.* No. 2,465,176. Mar. 22, 1949.

Fruit Freed of Rind During Passage Through Machine Equipped With Motor-Driven Rotary Cutters and Spindles Upon Which Fruit is Impaled—*A. C. Gross, Corpus Christi, Tex.* No. 2,465,223. Mar. 22, 1949.

Chewing Gum Tablet Made to Contain Hyoscine Hydrobromide and Acetyl Salicylic Acid to Inhibit Motion Sickness—*J. H. King, Bethesda, Md., J. S. Wolf, Washington, D. C., and R. R. Calvert, LaFayette, Ind.; Calvert interest to Wolf*—No. 2,465,233. Mar. 22, 1949.

Vegetables Cubed by Sectionalizing Cutting Machine—*G. W. Urschel, W. E. Urschel and J. R. Urschel, Valparaiso, Ind.* No. 2,465,670. Mar. 29, 1949.

Fine and Coarse Fiber Separated From Corn During Wet Milling, Dewatered by Gradual Pressure Upon Wet Mixture Against Perforated Surface With Continuous Removal of Water Until 2,000 psi. Pressure is Exerted—*K. I. L. Aspman, Chicago, and J. W. O'Brien, Flossmoor, Ill., to American Maize-Products Co.* No. 2,465,704. Mar. 29, 1949.

Chocolate Confectionery Made Directly From Prepared Cocoa Nibs and Other Dry and Wet Ingredients in Continuous Manner—*J. J. Alikonis, to Paul F. Beich Co., Bloomington, Ill.* No. 2,465,828. Mar. 29, 1949.

Whey Adjusted to pH Between 1.5 and 3.5 Preparatory to Heat Sterilization, Readjusted to pH Between 5.0 and 8.0, Inoculated With Yeast Culture, and Fermented, With Subsequent Recovery of Yeast—*A. M. Hanson, N. E. Rogers and R. E. Meade, Appleton, Wis., to Western Condensing Co., San Francisco.* No. 2,465,870. Mar. 29, 1949.

Lactic Acid Content of Protein Mixture Partially Neutralized With Non-Volatile Alkali to pH Between 5.65 and 6.5 and Further Neutralized With Volatile Alkali to pH Not Exceeding 8.5 Preparatory to Drying at Temperatures Which Volatilize Alkali Used—*E. W. Hopkins, Hinsdale, Ill., to Armour and Company, Chicago.* No. 2,465,875. Mar. 29, 1949.

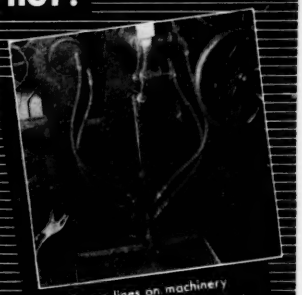
Whey Fermented With Lactic Acid and Propionic Acid-Producing Microorganisms and Concentrated to Make Stable Condensed Product that Gels Without Added Agents—*R. E. Meade and J. M. Stringham, Appleton, Wis., to Western Condensing Co., San Francisco.* No. 2,465,905. Mar. 29, 1949.

Liquid Whey Freed of Ash-Forming Mineral Content by Treatment With Resinous Cation and Anion Exchange Mediums and Spray Dried to Form Powder Readily Redispersible in Water and Resistant to Browning During Heat Treatment—*R. E. Meade and P. D. Clary, Jr., Appleton, Wis., to Western Condensing Co., San Francisco.* No. 2,465,906. Mar. 29, 1949.

Milk Product Suitable for Infant Feeding and Free From Cooked or Stale Flavors Obtained by Treating With Resinous Cation and Anion Exchange Mediums to Reduce Ash-Forming Constituents, Assayable Total Nitrogen, and Protein Decomposition Products Prior to Spray Drying to Form Powder Readily Redispersible in Water—*R. E. Meade and*

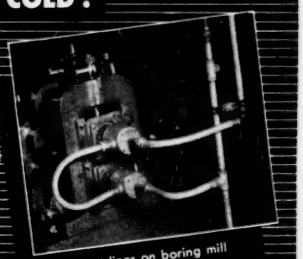
(Patents Continued)

HOT?



Steam lines on machinery

COLD?



Coolant lines on boring mill

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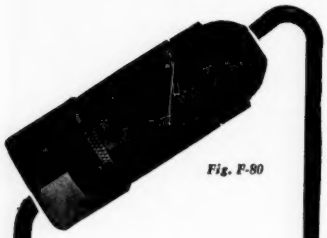

Fig. F-80

STAINLESS STEEL:

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"Hollow" cone, "Solid" cone, and "Flat" sprays furnished in pipe sizes and capacities to suit practically any problem where corrosive liquids are sprayed.

STONEWARE:

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Write for Catalogs 6A and 6C

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Patents

P. D. Clary, Jr., Appleton, Wis., to Western Condensing Co., San Francisco. No. 2,465,907. Mar. 29, 1949.

Degummed and Alkali Refined Soybean Oil Stabilized by Heating at 230-300 Deg. C. for 1 to 1½ Hr. Under Vacuum While Blowing Substantially Oxygen-Free Inert Gas Through Oil—*J. L. Jakobsen, Minneapolis, to General Mills, Inc., No. 2,465,969. Mar. 29, 1949.*

Sweetening Constituents Extracted From Fruit—*A. M. Erickson, San Jose, and J. D. Ryan, Campbell, Calif., to Barron-Gray Packing Co., San Jose, Calif. No. 2,466,014. Apr. 5, 1949.*

Edible Gelling Agent Made To Consist of 50 Percent Irish Moss Extract, 33⅓ Percent Locust Bean Gum and 16⅔ Percent of Potassium Chloride—*G. L. Baker, Newark, Del., to Krim-Ko Corp., Chicago. No. 2,466,146. Apr. 5, 1949.*

Cereal Flour Alkalized and Heat Treated to Inactivate Naturally Occurring Enzymes and Impart Adhesive Properties—*C. C. Kesler and W. L. Hicks, Cedar Rapids, Iowa, to Penick & Ford, Ltd., Inc. No. 2,466,172. Apr. 5, 1949.*

Oats Dehulled, Pulverized, Aspirated and Further Ground to Give 85-95 Percent of Oat Groat Through 60 Mesh Screen—*S. Musher to Musher Foundation, Inc., New York City. No. 2,466,260. Apr. 5, 1949.*

Oats Dehulled, Pulverized and Separated Into Two Fractions, Fine and Coarse, Preparatory to Gelatinizing Coarse Fraction and Drying at Temperature Under 170 Deg. F.—*S. Musher to Musher Foundation, Inc., New York City. No. 2,466,261. Apr. 5, 1949.*

Fish Cleaned and Sliced by Mechanical Means—*E. Rivers, Rockland, Me. No. 2,466,614. Apr. 5, 1949.*

Cream Heated to Milk-Fat Melting Temperature to Break Normal Milk-Fat-in-Milk-Serum Phase Relation Preliminary to Making Butter by Continuous Method—*H. C. Horneman, R. V. Hussong, S. N. Quam, and B. W. Hammer, to Sugar Creek Creamery Co., Danville, Ill., and Cherry-Burrell Corp., Chicago. No. 2,466,895. Apr. 12, 1949.*

Cream Subjected to Reduced Pressure, Direct Action of Steam and Centrifuging Preparatory to Making Into Butter—*H. C. Horneman, R. V. Hussong, S. N. Quam, and B. W. Hammer, to Sugar Creek Creamery Co., Danville, Ill., and Cherry-Burrell Corp., Chicago. No. 2,466,894. Apr. 12, 1949.*

Sour Cream Adjusted for Acidity and Heated to 170 Deg. F. Preparatory to Centrifuging to Break Original Cream Emulsion and Separate Fraction Containing From 80 to 90 Percent Milk Fat—*H. C. Horneman, R. V. Hussong, S. N. Quam, and B. W. Hammer, to Sugar Creek Creamery Co., Danville, Ill., and Cherry-Burrell Corp., Chicago. No. 2,466,896. Apr. 12, 1949.*

Pineapple Meat Mechanically Removed From Hard Tough Flexible Shell Tissue—*A. Schoening, to Hawaiian Pineapple Co., Ltd., Honolulu, Hawaii. No. 2,467,158. Apr. 12, 1949.*

String Beans Mechanically Arranged in Parallel Relation and Compressed Into Compact Continuous Mass for Division Into Separate Packs—*A. R. Thompson, to Food Machinery & Chemical Corp., San Jose, Calif. No. 2,467,276. Apr. 12, 1949.*

(Patents Continued)

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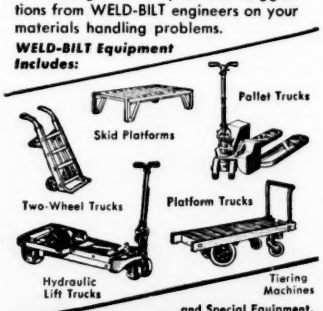

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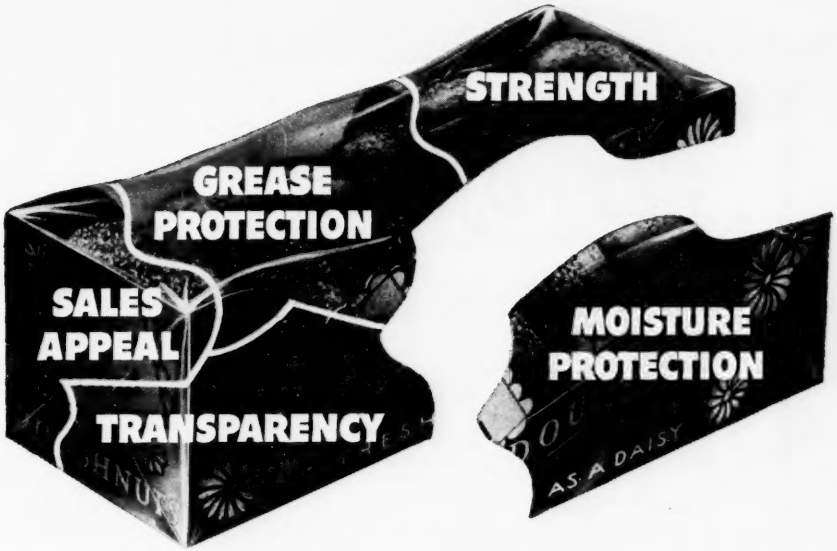

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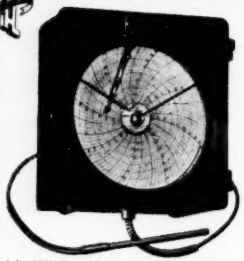

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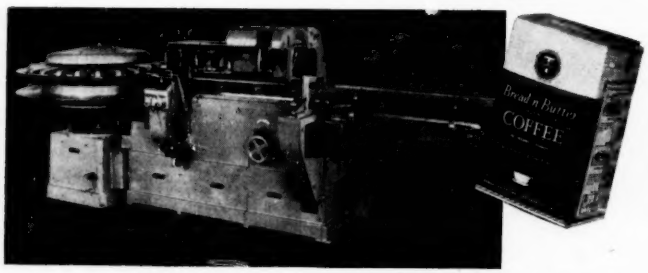

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Patents

Food Materials Dehydrated by Freezing to Expand Cellular Structure, Cutting Into Small Particles and Subjection to Air Steam Heated to Approximately 350 Deg. F. to Vaporize Frozen Water Content—*J. L. Kellog, to John L. Kellog & Co., South Elgin, Ill.* No. 2,467,318. Apr. 12, 1949.

Vegetable Seeds Subjected to Multi-Stage, Over-All Counter-Current Solvent Extraction for Recovery of Oil Content—*M. W. Pascal, to Sherwin-Williams Co., Cleveland.* No. 2,467,404. Apr. 19, 1949.

Crude Lactose With Low Ash Content Recovered From Sweet Whey—*E. F. Almy, and M. E. Hull, to M. & R. Dietetic Laboratories, Inc., Columbus, Ohio.* No. 2,467,453. Apr. 19, 1949.

Animal Body Tissue Ground Sufficiently to be Handled as Slurry When Heated Preparatory to Recovery of Fat Content—*J. C. Hormel to G. C. Hormel & Co., Austin, Minn.* No. 2,467,529. Apr. 19, 1949.

Vegetables Washed During Passage Through Machine Consisting of Two Circular Washing Tables Supported by Rollers and Fitted With Spray Pipes Connected With Water Supply—*O. M. Harlow, to M. W. Engelman, trustee.* No. 2,467,888. Apr. 19, 1949.

Fatty Materials Separated Into Fractions With Solvent Under Liquefying Pressure and Temperatures—*H. J. Passino and J. M. Meyers, to M. W. Kellogg Co., Jersey City, N. J.* No. 2,467,906. Apr. 19, 1949.

Shelled Peanuts Dry Roasted, Covered With Moisture-Repellent Coating, Cooled and Covered With Edible Coating to Which Salt is Applied—*W. W. Kelly.* No. 2,468,078. Apr. 26, 1949.

Starch Modified by Heating With Water and 0.5 Percent Sodium Stannate at Temperature Sufficient to Gelatinize—*R. W. Kerr, to Corn Products Refining Co., New York City.* No. 2,468,207. Apr. 26, 1949.

Chewing Gum Base Made to Contain Styrene Resin, Methyl-Substituted Styrene Resin and Mixtures Melting Within Approximate Range of 160 to 225 Deg. C.—*F. W. Corkery, and J. W. Church, to Pennsylvania Industrial Chemicals Corp., Clairton, Pa.* No. 2,468,393. Apr. 26, 1949.

Egg Substitute Made From Fat-Free Milk Casein Digested by Rennet in Presence of Dissociated Calcium Compound, and Dried—*T. W. Lindewald, S. Gruben, to Svenska Mjolkprodukter Akt., Stockholm, Sweden.* No. 2,468,677. Apr. 26, 1949.

Irregular Meat Cuts Packaged in Sheet Wrapping Material Which is Tightly Shrunk Upon and Bound About Meat Cut—*J. W. Ahrens, to Swift & Co., Chicago.* No. 2,468,700. Apr. 26, 1949.

Casein Purified by Adjustment to pH Between 4.0 and 6.0, Separation of Precipitate, Suspension in Water and Addition of SO_2 to Adjust pH to About 1.9 to Form Colloidal Sol Preliminary to Reprecipitation by Adjustment of pH Between 4.0 and 6.0—*R. J. Block and H. W. Howard, to The Borden Co., New York City.* No. 2,468,730. May 3, 1949.

Aconitic Acid Recovered From Sugar Cane Juice by Precipitation as Calcium Salt—*E. K. Ventre, to U. S. A.* No. 2,469,090. May 3, 1949.

—*End*

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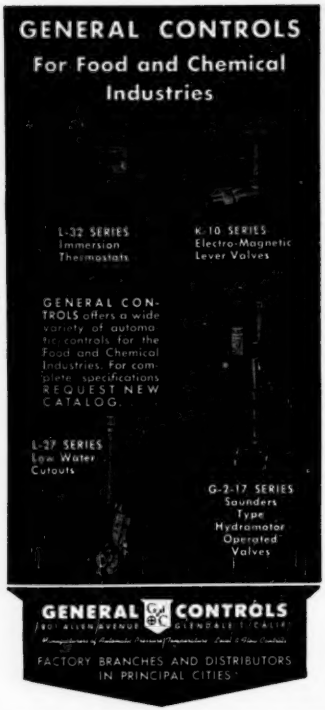
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Fibrousness in Asparagus

—Continued from page 79

the cuts. Pressure readings were grouped according to stalk-diameter classifications.

Fiber determinations were made according to the method described by Smith and Kramer[1].

Grades on the raw product were provided by an official grader of the Production & Marketing Administration. Organoleptic scores on the processed samples were provided by a judging panel of six technologists.

Readings Rise Away From Tip

Since the official grades for raw asparagus consider color and defects only, no official grade could be assigned to the fibrousness of the raw material. However, it was generally observed that there was good relationship between apparent fibrousness and pressure readings. Pressure readings tended to rise with increasing distance from the tip. The readings taken slightly above the natural snapping point of the stalks were invariably between 6 and 8 lb., depending on the size of the stalk. On the other hand, pressure readings beyond this snapping point increased rapidly to as high as 50 lb.

Computation of the correlation coefficient between pressure readings on the raw asparagus and organoleptic ratings for fibrousness on the canned product resulted in a value of .78. This value, though highly significant and promising, indicated that a factor other than the two being correlated was operative.

Upon closer analysis, it appeared that the lack of better correlation was due primarily to the effect of variations in stalk diameters. Thus, when samples were first segregated by size, the correlation coefficients were higher—.82 for the small, and .87 for the large stalks.

Considering the great variability among stalks of asparagus and the fact that the method of taking pressure readings for the stalks differed from that employed with the cuts, these correlations are significant. They indicate that with separate scales established for stalks of different diameters, the pressure readings on the raw product will indicate with sufficient accuracy the fibrousness of the canned product.

The data in the accompanying table illustrate the effect of the different stalk diameters on the relation between pressure readings and organoleptic ratings.

Fiber content of the raw and canned asparagus is identical, since the raw sample must be cooked before the fiber test can be applied. The amount of cooking has no effect on the results[2].

The data presented are fiber determinations on the canned samples. However, the results may be applied to the raw product as well. Determination of quality for the raw stock should of course, be as rapid as possible. The aim is that the pressure readings may serve as routine evaluations of fibrousness for the raw stock, with the fiber test serving primarily as a check, especially on the final quality of the finished product.

Significant Percentages

The correlation between fiber content and fibrousness as determined organoleptically was .94. Data in the table show that this logarithmic relationship also suggests the probability that the significant fiber content is in the range of .10 to .80 percent. Values below .10 percent are practically equivalent to no fiber. All values above .80 percent are indicative of excessive fiber to such a degree that even double that fiber content affects organoleptic grades only slightly.

There remains the correlation between the pressure readings on the raw product and fiber content, so that the entire evaluation of fibrousness may be made on an objective basis. This relationship is also affected by size as measured by diameter of stalk.

This important quality factor—fib-

Instrument Readings Predict Organoleptic Values

RELATION of Raw Asparagus Pressure Readings Taken by New Instruments, and Fiber Content Determined by Standard Test*, to Organoleptic Evaluation of Fibrousness in Canned Asparagus

Pressure Readings in Lb. On Raw Asparagus		Fiber Content Percent	Organoleptic Evaluation of Samples
Small Stalks (up to 3/8")	Large Stalks (5/8" & over)		
4.4	4.8	.03	10. No fiber
5.4	6.0	.05	9. Trace of fiber
6.5	7.3	.08	8. Slight fiber
7.6	8.7	.14	7. Little fiber
8.9	10.4	.21	6. Some fiber, not objectionable
10.3	12.2	.34	5. Border-line objectionable
11.7	14.1	.54	4. Objectionably fibrous
13.3	16.4	.89	3. Excessively fibrous
15.0	18.8	1.42	2. Border-line inedible
....	....	....	1. Woody

* Smith and Kramer

for a greater profit margin

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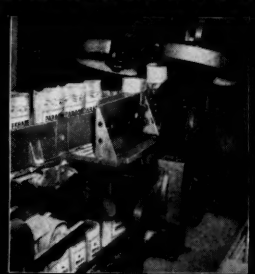

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Maintenance men said "give us a strainer with a blow-off cap that comes out easily and makes up tight; a screen that can be put back in place without a lot of fiddling around".
• The easy-to-remove Yarway cap meets these requirements. It has straight (not tapered) thread, machined face and spark-plug-type gasket. Permits easy removal for cleaning. Insures proper screen alignment when replaced in body.
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YARWAY STRAINERS
"Police the Pipelines"

rousness—has long been associated with dimensions of the stalk, color, and condition of storage of the raw product. Although there is, in general, a relationship between the distance from the tip of the stalk and fibrousness, the proportion of the stalk length that is practically free of fiber varies greatly as the result of growing conditions. Under adverse conditions, only 2-3 in. of the entire shoot may be free from fiber. However, under favorable conditions, 10 in. or more may be entirely acceptable.

Green vs. White

The green portion of the stalk is commonly less fibrous than the white. But all too frequently, green portions of stalks contain objectionable quantities of fiber. The effect of storage conditions on apparent fibrousness has been explored, but until recently results were inconclusive[2].

Several investigations have been made previously of asparagus' degree of fibrousness.

Smith and Kramer[1] presented a rapid method for determining the fibrous material in canned asparagus and showed that fiber content increases rapidly beyond the stalk's natural snapping point. Values obtained by this method were not affected by variations in canning procedures. Fiber of fresh and frozen asparagus may be determined by the same method—but, the sample must be cooked before the test is made.

Wilder[3] developed an instrument, called the "Fibrometer", for measuring the fibrousness of canned asparagus. The device consists of a stainless steel wire to which a 3 lb. weight is attached. A stalk is considered tender from the tip to the point where the wire will cut through.

Lee[4] obtained promising results using the tenderometer as a means of measuring fibrousness of raw asparagus.

Needed New Instruments

The "Fibrometer", it may be noted, could not be used on raw asparagus. And the tenderometer was not applicable to field and inspection conditions, or to the determination of fibrousness of individual stalks. For these reasons, the two special instruments were developed to record resistance to cutting.

MacGillivray,[5] employing the conventional fruit pressure tester with ⅛-in. plunger, found that resistance increased with duration of season and distance from the tip. Adaptation of the plunger tester followed.

U. S. Standards for raw green asparagus have, as indicated, made no mention of the fibrousness factor[5].

Important FACTS ABOUT pH for FOOD INDUSTRY EXECUTIVES

WHETHER you are an executive responsible for planning long-range plant production, or for obtaining maximum efficiency from present processing operations, one of the most important advancements you can make is the installation of BECKMAN pH CONTROL. Through the proper application of modern pH control you can make *many* vital savings . . . savings that will quickly pay for the installation and will continue paying big dividends throughout the years. For example, some of the many benefits resulting from Beckman pH Control include . . .

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. . . better control and processing of a wide range of dairy products.
. . . better sterilization, flavor and quality in canning and preserving operations.
. . . *and important savings in time, quality and processing costs in virtually every type of food processing operation.*

BUT TO MAKE CERTAIN you get the latest, most convenient and most accurate pH equipment available, *be sure to specify* "BECKMAN"...

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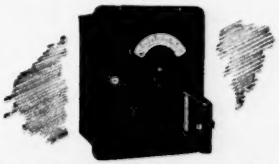
With Beckman equipment no time-wasting or troublesome sampling devices are needed. Beckman pH electrodes may be installed directly in vats, tanks, channels or flow lines—and exact pH values read instantly—and continuously, if desired—on the process fluids themselves.

Unique rugged-type Beckman Electrodes, specially designed for direct immersion in abrasive or suspension-laden fluids, reduce maintenance to an absolute minimum. *Beckman is the most trouble-free of all pH equipment!*

The above are only a few of many Beckman advantages. Beckman pioneered the modern glass electrode pH instrument . . . pioneered the first completely automatic pH indicator, recorder and controller . . . pioneered High Temperature Glass Electrode which can be used continuously at temperatures as high as 212° F. (100° C.) . . . pioneered High pH Electrodes which permit accurate measurements of high pH values even in the presence of sodium ions . . . and pioneered many other vital advancements. In fact, Beckman is the only pH equipment embodying every modern advancement in the field of pH.

THERE'S A BECKMAN pH INSTRUMENT FOR EVERY NEED



COMPLETELY AUTOMATIC! The Beckman Model R instrument operates directly from standard 110 v. A.C. lines to provide completely automatic pH indication. Also provides for completely automatic pH recording and automatic process control. Can be installed to give accurate pH readings from various stations in plant through one instrument. *This is the pH unit being installed by today's most modern plants, large and small.*

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Using a standard 18 gauge 36 x 120" sheet as an example, the theoretical weight is 63 pounds, but this weight could permissibly vary between 65.52 pounds and 59.22 pounds.

Now you can order MicroRold stainless steel sheets to a decimal thickness plus or minus 3%.

A sheet of MicroRold .0475 thick would weigh 59.85 pounds thus insuring a saving of 3.15 pounds (5%) from the theoretical weight, or 5.67 pounds (8%) from the maximum, while still remaining within the 18 gauge range.

	.052"—65.52 Pounds	
Weight of One Sheet	.051"—64.26 Pounds	Theoretical Wt.
of 18 Gauge 36 x 120	.050"—63.00 Pounds	63.00 Pounds
Plus or Minus 10%	.049"—61.74 Pounds	
	.048"—60.48 Pounds	
	.047"—59.22 Pounds	

Weight of One Sheet of MicroRold .0475 36 x 120 Plus or Minus 3%	.0475"—59.85 Pounds Theoretical Weight 59.85 Pounds

Average saving in theoretical weight 3.15 Pounds per sheet—or 5%.

Remember, this saving is expressed in pounds per single sheet. Multiply your saving by the number of sheets you use per month and the price per pound. You'll have a strong dollars and cents reason for specifying MicroRold stainless steel every time.

WASHINGTON STEEL CORPORATION

WASHINGTON, PENNSYLVANIA

And, in the U. S. Standards for canned asparagus, the tenderness factor is not defined, except by statements that noticeable fibers may not be present in a given portion of the stalks[7].

References

1. Smith, H. R., and Kramer, A., "The Fiber Content of Canned Green Asparagus." *The Canner*, 104:18:14-16. Apr. 26, 1947.
2. Scott, L. E., and Kramer, A., "Physiological Changes in Green Asparagus After Harvest." Submitted for publication in *Proc. Amer. Soc. Hort. Sci.*
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7. "U. S. Standards for Grades of Canned Asparagus." Mimeog. Issued Apr. 27, 1945. Washington, D. C.

The above article is from, "Asparagus Pressure-Fiber Tester: Objective Methods for Measuring Fibrousness In Raw and Canned Asparagus", Scientific Publication No. A239, Contribution No. 2170 of the Maryland Agricultural Experiment Station (Department of Horticulture). Partial support from Regional Hope-Flanagan funds, Project NEM 3. This is part of a paper presented before the American Society for Horticultural Science and the Tri-State Packers Association.

—End—

Wet Milling Advances

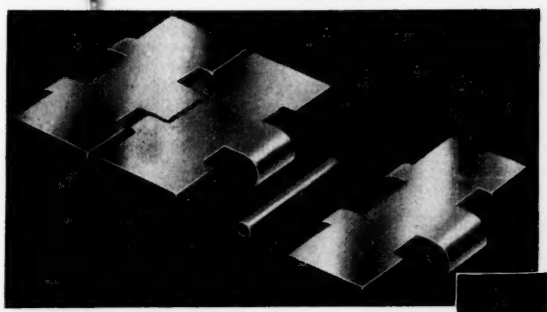
—Continued from page **44**

Also noteworthy is the fact that the precoat filters that receive the sirup from the converter are controlled entirely automatically with respect to precoating, filtration of sirup, washing off of the coat and application of the new coat. These operations are managed by a cycle controller of Corn Products' design. Former practice was to perform such operations manually.

Clarified sirup from the filters is discharged by gravity to carbon treating tanks where once-used activated vegetable carbon is introduced to reduce color and remove impurities. The tanks are cylindrical and of stainless steel, such metal being used because of the acid nature of the sirup up to this point. The carbon-sirup mixture is separated in three Sweetland pressure leaf filters operating in parallel. The carbon is washed on a drum type, vacuum filter to recover residual sugar. At this point the carbon is discarded.

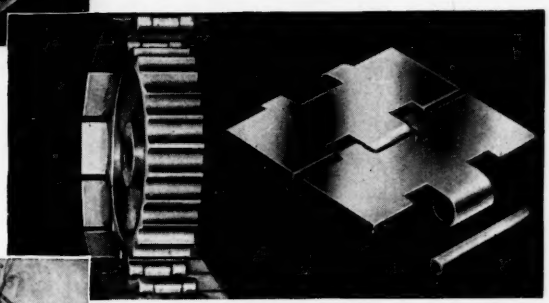
Clarified sirup from the Sweetlands is pumped to the ion exchange station

4 BIG ADVANTAGES
You Get With
REX TABLETOP Conveyor Chain



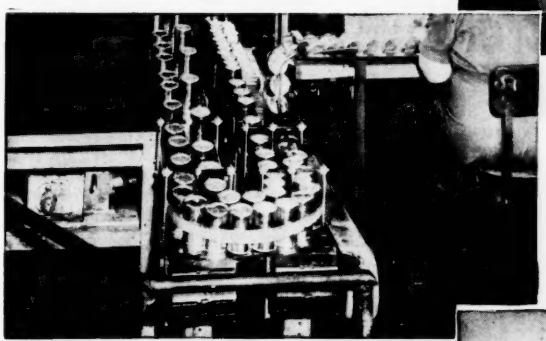
1 *Simple Design*

A sturdy one-piece platform link and pin are the only parts... no attachments or rivets to work loose or "wobble." It adds up to greater steadiness . . . less chance for breakage and spillage.



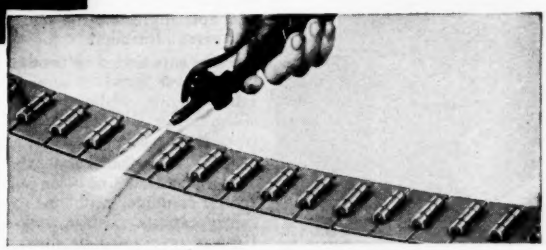
2 *Long Life*

Table Top wears less . . . load for load, job for job. Note how the entire length of the Table Top joint is engaged by the sprocket teeth. Tooth bearing pressure is spread over the length of the joint. Pin is relieved of load when flexing.



3 *Stops "Jamming" and Tipping*

The Table Top exclusive hinged-joint design provides a continuous carrying surface. There is no gap across the width of the links to catch and trip containers. Table Top slides freely under blocked containers, avoiding pile-ups, spillage and breakage.



4 *Stays Cleaner*

. . . and is easier to clean when necessary. There are no pockets to catch and hold foreign matter . . . surfaces are smooth, edges are fully rounded. Dirt can't accumulate between joint and sprocket tooth. When cleaning is necessary, a jet of steam or water will do the job quickly and easily.

These 4 big advantages of Rex Table Top, the original hinged-joint flat top conveyor chain, mean long, economical service to you. It's available in either stainless or case-hardened steel. For all the facts, send for your copy of Bulletin No. 47-15. Chain Belt Company, 1616 West Bruce Street, Milwaukee 4, Wis.

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where the acid is removed, as well as residual color and other impurities. *Once more, it is interesting to note that the use of the ion exchange principle is a new departure in wet milling. Conventional practice has been to neutralize with sodium carbonate and then decolorize and refine the sirup over bone black.* Engineers involved in designing the Bluebonnet plant concluded that the ion exchange system has advantages over the older practice.

They point out that the ion exchange system eliminates the appreciable capital investment required for a bone black revivifying unit. They also are convinced that with this system the yield of sugar is higher, considering the relatively large loss of sugar that would be entailed in bone black processing. Finally, they point to the comparatively higher purity of sugar obtainable by the ion exchange process. This process is the first commercial application to the wet milling industry for the refining of dextrose sirups, although Corn Products has a commercial unit operating on corn sirup at Pekin, Ill.

How Ion System Operates

In this system the sirup from the converter is passed successively through a series of ion exchange columns consisting of vertical carbon steel chambers with rubber linings. Piping for the system is largely stainless steel. At any one time, six columns are on stream and two are being regenerated.

A centrifugal pump moves the sirup into the first of the six columns—the anion column, where are removed acid radicals, such as sulphate, carbonate, etc. Under the influence of constantly decreasing air pressure superimposed in this and succeeding columns, the sirup moves successively from the first anion column into an alternating succession of cation and anion towers. In the cation chambers, any metals present are removed. Both types of columns have a further refining influence with respect to organic impurities, including color-forming agents.

Timed Automatically

From 300 to 400 lb. of sugar (dry basis) per cu. ft. of ion exchange material is purified before regeneration is necessary. It is expected that between 500 and 1,000 regenerations of material will be practicable before it will have to be rejected. Anion columns are regenerated with an alkali; cation columns, with an acid. The timing of the entire cycle is managed automatically by a timing device system, which, Bluebonnet engineers declare, is the first completely automatic arrangement involving an ion exchange system in the industry.

VODOL-XX is the exclusive product of Refining Unincorporated

GOLDEN BROWN
Naturally
Free-flowing!

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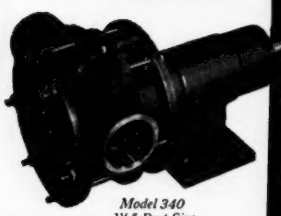
NEW.. JABSCO stainless steel PUMPS



Model 340
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Models also available in ¾" and 1" port sizes.

Only a Jabsco Stainless Steel Pump gives you—

A completely reversible neoprene impeller—vacuum in excess of 27" of mercury.

Pressures from 0 to 40 PSI.

Capacities up to 55 GPM of water 1750 RPM at 0 PSI.

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Pumps available in bronze & other metals.

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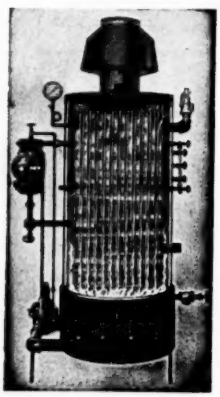
STEAM—AS YOU WANT IT . . . WHERE YOU WANT IT



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Effluent from the ion exchange system is given an initial evaporation in a rising film, triple-effect evaporator. The concentrated sirup is then treated with virgin vegetable carbon for further color removal. The carbon is taken out by passage through Sweetland leaf pressure filters, reslurried with water and pumped back for additional use in the carbon treating tanks mentioned above.

Stainless Steel Employed

Filtrate from the Sweetlands is passed through a Sweetland precoat filter to remove the last traces of carbon. This clarified sirup is given a final evaporation in a single effect, falling film evaporator. The concentrated sirup is pumped to the crystallizer house and into cooling tanks to obtain the proper crystallizer filling temperature of about 120 deg. F. These tanks are lined with stainless steel, fitted with cooling water coils and are motor-agitated. The cooled, concentrated sirup is pumped to a system of 38 water-cooled crystallizers operating in parallel. This equipment, consisting of horizontal, cylindrical vessels with outside water jackets and inner coils, is lined with stainless steel. Within three to four days, the sugar crystals are formed.

The crystal mass, or massecuite, is dropped into a mixer box where the mass is kept in constant agitation and supplied to centrifuges. The box is lined with stainless steel and has a stainless steel agitator running its full length. The centrifugals, 19 operating in parallel, are horizontal, stainless steel, basket machines. These separate the crystals from the mother liquor, which is returned to process. Details on the handling of the liquor have not yet been disclosed.

Use Basket-Type Units

The centrifugals are conventional perforated basket machines with individual motor drives. Massecuite passes into the baskets, mother liquor is thrown off and the crystals are discharged at the bottom. The process of charging and discharging each machine is manual; all other operations involved are automatic, including spinning off the liquor, adding a controlled amount of wash water, and spinning dry. This degree of automatic control is another departure in the industry, where prevailing practice is manual operation throughout. The total elapsed time for charging a basket, spinning off liquor, washing, spinning dry and discharging is only about 30 min.

The crystals discharged from the centrifugals are dried in a rotary horizontal cylinder using hot air in direct contact with the crystals. The dried

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★ ★ ★

FOR DIRECT CONTACT FREEZING, glycerine, glycerine-salt, and glycerine-invert sugar solutions have been found by one experimenter to be more satisfactory than any of the other salt, syrup, or combination solutions tested for direct contact freezing. (F-15)

★ ★ ★

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I should like to know the source of those items appearing in Technical Glycerine News which I have checked below.

☐ F-12 ☐ F-13 ☐ F-14 ☐ F-15 ☐ F-16

NAME.....

COMPANY.....

ADDRESS.....

sugar is then cooled in a rotary horizontal cooler where cool air is injected, and the product is next conveyed by a Redler chain elevator to the packaging building. There the sugar is screened on a vibrator for the removal of any oversize material, which is returned to process.

Finally, screened sugar drops to a hopper and a scale automatically controls the movement of sugar into the bags.

In the sugar refinery the extensive use of corrosion-resistant materials is adopted in order to minimize corrosion and maintain purity of product. Piping, with exception of utility lines, is of stainless steel or copper. Tanks are lined with stainless steel. Stainless tubes are used in the single-effect and triple-effect evaporators. All Sweetland presses are stainless lined and have stainless leaves. The filters are also of stainless steel to assure a high quality product.

The list of plant officials includes J. F. Morton, manager; F. W. Holm, superintendent; F. A. Giesecke, plant engineer; G. R. Kramer, wet and dry starch superintendent; H. M. Ewing, refinery superintendent; and T. H. Pierson, instrument superintendent; R. F. Heuhner, process engineer and R. W. Bond, chief chemist.

—*End*

Farquhar Conveyors *load direct from production line . . . eliminate all bottlenecks for* Champlain Valley Fruit Co.

THE Champlain Valley Fruit Co. of Burlington and Rutland, Vt., handles packages, boxes, bags, faster and cheaper with Farquhar Conveyors. T. G. Lumbra, vice-president, says: ". . . Farquhar is the answer to handling *consumer-size* packages . . . eliminates bottlenecks at trucks, and the conveyors may be *reversed* to pick up incoming loads in addition to regular production line loading."

With Farquhar Conveyors on the job packaged fruit is handled only once . . . moves directly from the production line right into the trucks . . . saves manpower and time. Farquhar Package Conveyors handle packages quickly and easily, offering maximum flexibility for all types of packing jobs. Champlain's overhead has been cut to the bone.

Hundreds of similar stories from laundries, food processors, grain and feed mills, chemical and paper plants, coal yards, contractors, warehouses, *echo more man-hours saved . . . handling is speeded up . . . over-all costs reduced* with Farquhar Conveyors.

Whether you stack, pile, load, unload or move materials from floor to floor . . . whether it's bags, bales, boxes, cartons, bundles, *any* kind of packaged or bulk materials—Farquhar has the right materials handling conveyor to do your job *faster, better, cheaper.* Tell us your handling problem; we'll give you the information you need.

Write for information to A. B. FARQUHAR CO., *Conveyor Division,* 205 Duke St., York, Pa., or 628 W. Elm St., Chicago 10, Ill.

Mounted on tracks inside building, this Farquhar counter-balanced Conveyor handles packages across railroad tracks in either direction: from trucks, cars . . . to storage or for reloading!

Farquhar
PORTABLE OR PERMANENT MATERIALS HANDLING
CONVEYORS

HYDRAULIC PRESSES · FARM EQUIPMENT · FOOD PROCESSING AND SPECIAL MACHINERY

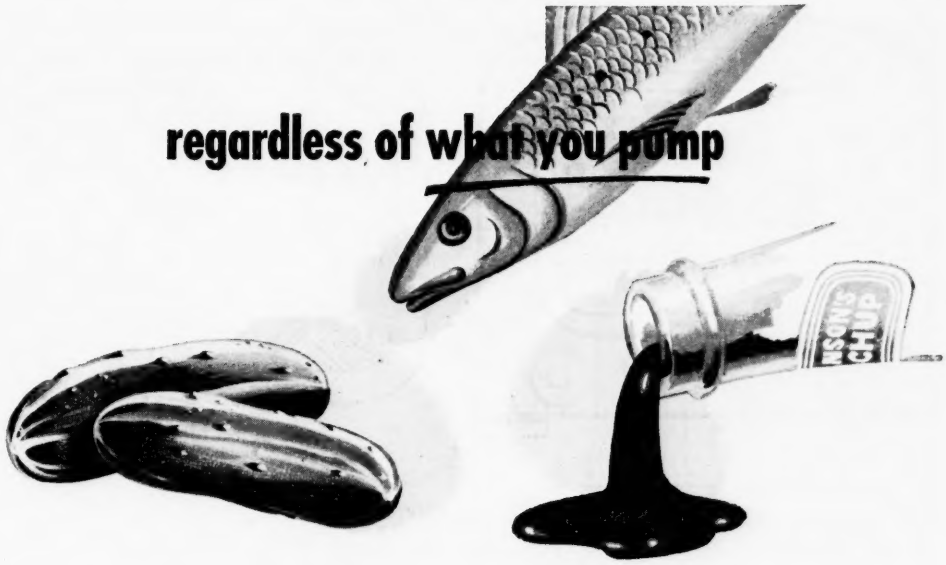
HUNTING FOR GLYCERINE?

Armour has it as close as your phone. Just call the nearest of Armour's 332 convenient stock points for all grades. Quick delivery keeps your inventories low.

ARMOUR *Glycerine Division*

Armour and Co., 1355 W. 31st St., Chicago 9, Ill.

regardless of what you pump



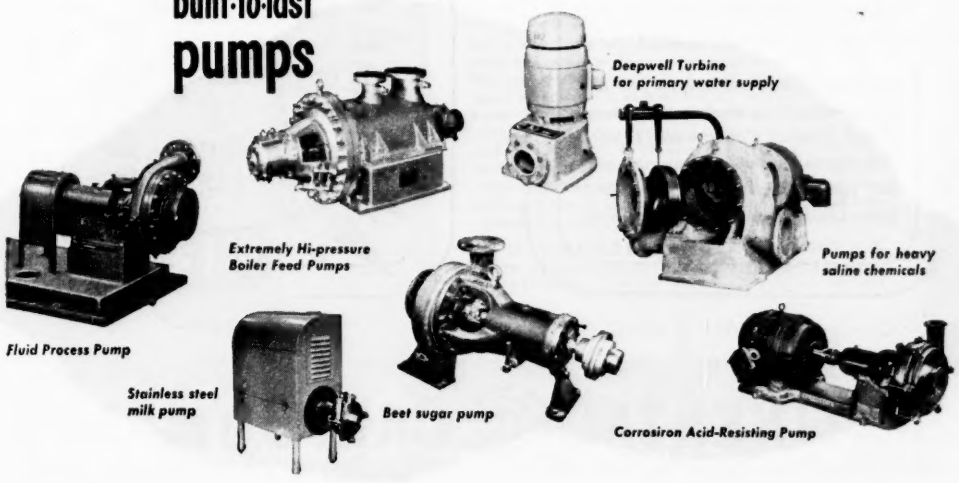
FROM PICKLES TO KETCHUP, Byron Jackson experience can answer your requirements, regardless of what you pump. Many applications considered SPECIAL are part of Byron Jackson's 77 years experience. Pioneers in the development of many specialized lines of pumps, BJ engineers have gained specific experience in building the right pumps for the foods industry.

LOOK TO BJ when you plan to expand or to alter your present facilities. Regardless of fluids handled, capacities, or pressures—your particular pumping jobs can be figured quickly and expertly by BJ engineers. For further information on BJ Pumps, contact your local BJ Representative or write direct describing the necessary plant operating conditions.

BJ

built-to-last pumps

Byron Jackson Co.
Since 1872
LOS ANGELES 54, CALIFORNIA
Offices in Principal Cities
PLANTS: Los Angeles • Bethlehem • Houston • Fresno



Deepwell Turbine for primary water supply

Extremely Hi-pressure Boiler Feed Pumps

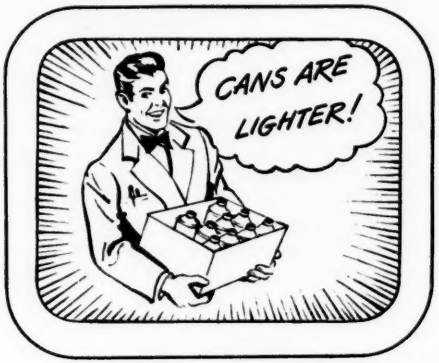
Pumps for heavy saline chemicals

Fluid Process Pump

Stainless steel milk pump

Beet sugar pump

Corrosiron Acid-Resisting Pump

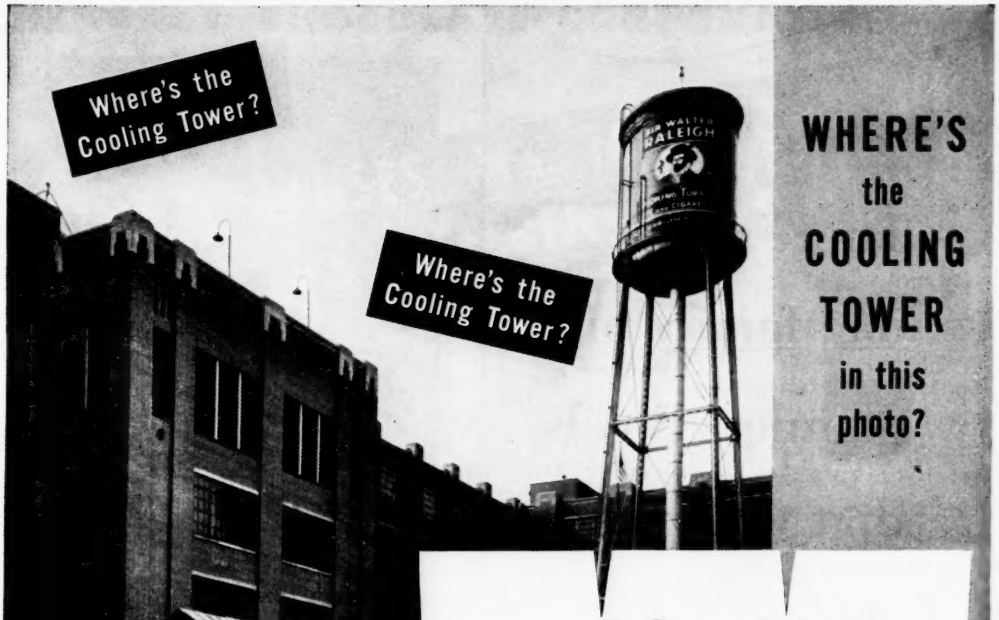


There's a screenful of reasons why grocers like to sell beer in *cans*.

Cans won't break and mess up your display shelves. Cans eliminate the return-deposit nuisance. Cans are easy to store and easy to handle. And your customers like canned beer because cans chill faster and are no trouble to dispose of.

CONTINENTAL CAN COMPANY

100 EAST 42ND STREET NEW YORK 17, N. Y.



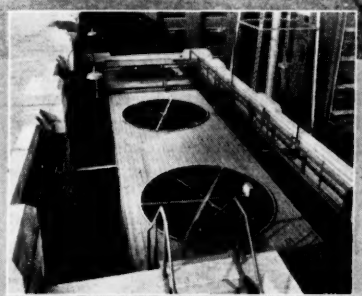
WHERE'S the COOLING TOWER in this photo?

A Beautiful Air Conditioned Building

But Where's the Cooling Tower?

That's right, where's the cooling tower? So effective has been the outer construction of this C. H. Wheeler water cooling tower, that it is in complete harmony with the appearance of the building in which it is housed and is hardly noticeable. Actually, the tower is located in the foreground of the photograph and the air inlet louvres can be seen where they give a venetian blind appearance in space ordinarily allowed for windows. As engineers and builders of cooling towers, it is conceded that most are not a thing of beauty, but where appearance is important, the casing can be made to blend with other buildings like this one—whether it be brick, stone or masonry.

In air conditioning systems for large buildings, C. H. Wheeler towers effectively cool for recirculation whatever volume of water is needed to dissipate the heat absorbed by the refrigerant. Furthermore, only a small amount of make-up water is required to compensate for drift and evaporation losses. Wide acceptance of C. H. Wheeler towers for this service is based on guaranteed water cooling performance, and the fact that C. H. Wheeler engineers especially design and custom build every tower to meet the varying cooled water requirements of any air conditioning system. For a cooling tower of lasting satisfaction and guaranteed performance, consult C. H. Wheeler. Write for Catalog No. 145.



Upper photograph shows the "built-in," induced draft cooling tower. The lower insert is a close-up view of the propeller fans and fan guards hidden from ground level view by the coping on building.

C. H. WHEELER MANUFACTURING CO.
1828 Sedgley Avenue, Philadelphia 32, Penna.
REPRESENTATIVES IN MOST PRINCIPAL CITIES

SINCE 1903

C. H. Wheeler

STEAM CONDENSERS • WATER COOLING TOWERS
EJECTORS • STEAM JET VACUUM REFRIGERATION
OF PHILADELPHIA

There's only one family of Stainless Steels that will meet all your requirements

ALLEGHENY METAL is the *only* stainless steel that is produced in every commercial grade and finish—and more especially, in every shape or form that a fabricator may need.

From *one* source, therefore, you can get everything . . . sheets, strip, plates, bars, wire, shapes, fine wire, tubes, castings or forgings—in the type of stainless steel that the service conditions require. What's more, you can get it *now* . . . Allegheny Metal is promptly available to your order.

Use this convenient, one-stop source of supply for stainless steel—the clean, strong, shining metal that's cheapest in the long run because it *lasts* longest. ● When you're in the market for stainless, think first of Allegheny Metal.

W&D 2342 *Complete technical and fabricating data—engineering help, too—yours for the asking.*

ALLEGHENY LUDLUM STEEL CORPORATION

The Nation's Leading Producer of Stainless Steel in All Forms

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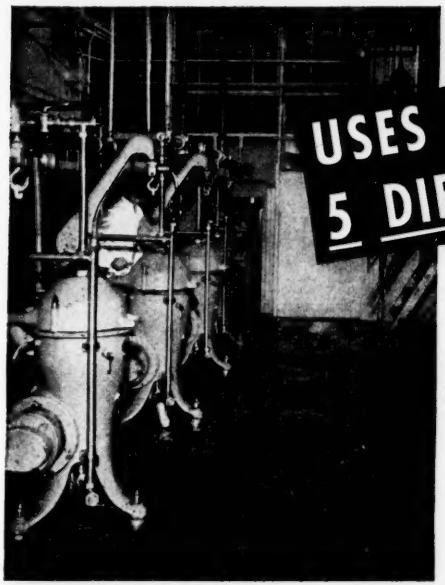
Allegheny Metal is stocked by all Jos. T. Ryerson & Son, Inc., Warehouses

HERSHEY CHOCOLATE CORPORATION—



USES ME TO SPEED UP 5 DIFFERENT SEPARATIONS

"I am De Laval Centrifugal Force. I speed up many operations in chemical process and food plants by making the separation or clarification ***continuous***. One plant where the engineers really put me to work is that of the Hershey Chocolate Corporation—I do 5 different jobs:

A primary step in making Hershey milk chocolate is the clarification of all milk.

1 REMOVE ALMOND DUST FROM NUT OIL
2 DEHYDRATE INSULATING OIL
3 CLARIFY ALL MILK ENTERING PLANT
4 MAINTAIN LUBRICATING OIL EFFICIENCY
5 REMOVE DIRT & WATER FROM TURBINE OIL

Hershey is a good example of how a plant can use centrifugal force in many ways. Obviously, the needs vary according to the product manufactured: some processes call for a small Clarifier, some for a De Laval "Nozzle-Matic" with its 6,000 gallons an hour or more capacity. De Laval has the proper machine for each continuous separation requirement.

The complete story of how De Laval centrifugals are used at Hershey Chocolate Corporation is given in the De Laval Centrifugal Review — Vol. 15, No. 1. Write for your free copy.

THE DE LAVAL SEPARATOR COMPANY
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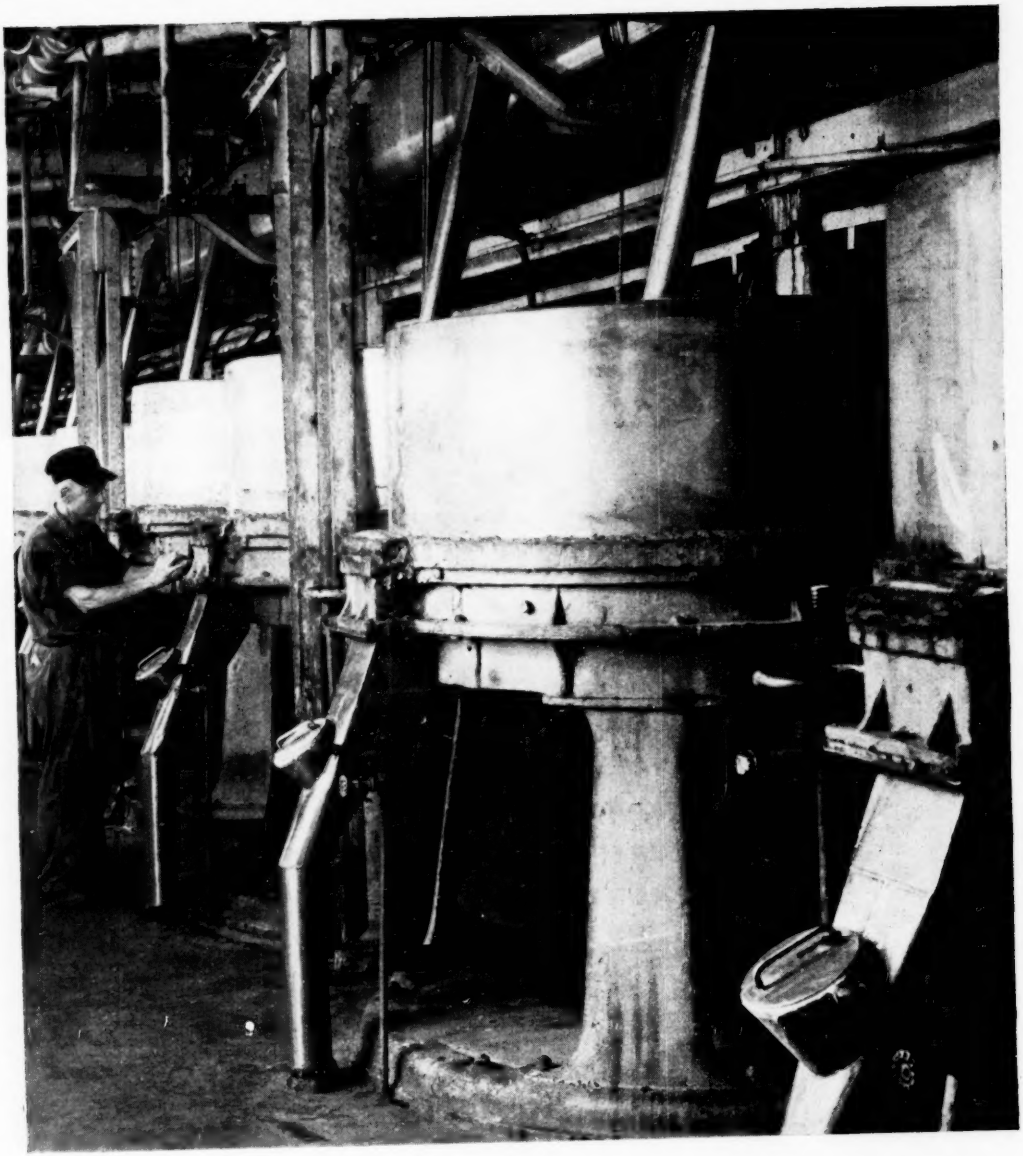
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval

CONTINUOUS *CENTRIFUGAL* MACHINES

Better, Faster Food Processing
CLARIFICATION · CONCENTRATION



Enduro

REG. U. S. PAT. OFF.

REPUBLIC STEEL

REG. U. S. PAT. OFF.

THESE BUHR MILLS OF TYPE 316 ENDURO STAINLESS STEEL grind corn kernels to a fine mash. Originally, cases of these mills and chutes and troughs were wood. Today, the industry has largely replaced them with stainless steel—the long-life, sanitary, efficient metal. Among the many effective applications of ENDURO in the food industry's various process lines are—broilers, cabinets, cookers, evaporators, kettles, ovens and steam tables, filters, mixing machines, pasteurizing tanks, pickle tanks, quick freeze equipment and refrigerators, dish-washers, drainboards, sinks, strainers, and work tables, as well as a long list of smaller utensils. ENDURO *belongs* wherever food is processed.

MEET HER CHALLENGE *with Stainless Steel...*

Your final customer, the housewife, who picks up your brand from counter or supermarket island, knows her way around both as to quality and price—and she insists on both. To the processor of that brand it means that there must be quality control in process, and every production economy he can bring into play.

ENDURO Stainless Steel is made to order for that assignment. It is strong and tough, highly resistant to corrosion and to heat, has exceptionally long and trouble-free life. Replacement is therefore negligible, repair infrequent, and cleaning time at a minimum.

But ENDURO is more. It is the sanitary metal, with a mirror-smooth surface providing no foothold for carry-over to contaminate food in process. It is also a chemically neutral metal, in no way altering either the color or flavor of food in process. It is the "*quality control*" metal.

ENDURO pays off doubly . . . reducing costs of processing and maintaining quality. If you have not already switched to ENDURO, check today with your equipment source or write for full details to:

REPUBLIC STEEL CORPORATION
Alloy Steel Division • *Massillon, Ohio*
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

STAINLESS STEEL

✓ ***Check ALL 10 Advantages:*** • **RUST AND CORROSION-RESISTANCE • HEAT-RESISTANCE • HIGH STRENGTH • EYE APPEAL NO METALLIC CONTAMINATION • SANITARY SURFACES • EASY TO CLEAN • EASY TO FABRICATE • LONG LIFE • LOW END COST**

LA PORTE

FLEXIBLE STEEL CONVEYOR BELTING

Cuts Food Handling Costs

Today more and more food plants are installing this long wearing Conveyor Belting to offset rising production, maintenance and replacement costs.

- It resists impacts, wear, heat, cold and rust.
- It grips the friction drum, eliminating creeping, weaving, jumping and rubbing on pulley stands.
- Permits circulation of air, water or heat around products in process and sterilizing with steam or scalding water.
- Its perfectly flat surface provides for the safe handling of glass, tin or paper containers, empty or filled.
- It is one belt for every process.

You can save money with La Porte Flexible Steel Belting. It is available in any length and practically any width. Write at once for literature and prices.

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BOX 124 LA PORTE, INDIANA

IF YOU'RE THINKING OF

Customer Satisfaction

YOU SHOULD BE THINKING OF

D&O *Flavors*

Because assured customer satisfaction for your seasoned or flavored food product can be achieved easily with Spiceolate (water-solublized) flavors, Essential Oils or Oleo Resins.

In addition to manufacturing a superior food product you also gain production economies resulting from lower handling and storage costs.

Satisfy yourself — Satisfy your customers — Consult D & O.

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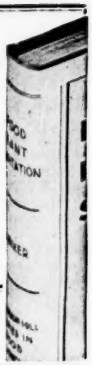

1 FOOD PLANT SANITATION

By Milton E. Parker. Offers proven sanitation methods on everything from effective plant layout and design to the proper selection of packaging materials. Makes available to you practices in accordance with the Federal Food, Drug and Cosmetic Act. **$6.00**

2 FLAVOR

By C. E. Crocker. A source of reference information on every aspect of flavor and taste. Includes the chemistry of flavoring agents and condiments . . . methods of developing flavor in processed foods . . . methods for the detection, correction and prevention of undesirable flavor in commercial products. **$3.00**

3 Commercial Fruit and Vegetable Products

By W. V. Cruess. A thorough treatment of the application of scientific principles to the manufacturing and preserving processes. Covers important advances in canning, spoilage, frozen-pack foods, packaging, etc. New Third edition. **$8.50**

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By S. C. Prescott and B. E. Proctor. This book discusses the manner in which foods are harvested, transported, manufactured and prepared for use; why certain processes are utilized and how the methods are practiced. **$5.50**

5 MILK and MILK PROCESSING

By B. L. Herrington. Gives the basic information necessary for work in the dairy industry and understanding of milk and milk products. Emphasizes the principles underlying the processing of milk and gives background material on biochemistry. **$3.75**

6 INDUSTRIAL MICRO-BIOLOGY

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Position F-Food-8-49

"Gee...spread it on thick!"

**Manufactured by M. Polaner & Son, Inc., Newark, N. J.*

Little wonder the kids, and grown-ups too, go for these Polaner products. They look luscious and are so delicious. With Polaner's Jellies, Preserves or Marmalades like these on hand, the afternoon snack problem is solved.

To solve sealing problems, we suggest that manufacturers and packers examine the advantages that Crown Closures have to offer. Take the Crown Screw Caps used on these products* for example. They have two exclusive features that make for dependable sealing . . . the Deep Hook Thread construction that gives extra sealing pressure, and Crown's specially developed, full thickness liners . . . a liner that's carefully selected for these particular products.

If a metal closure is part of your package it will be to your advantage to get Crown's recommendations before you re-order. There is no obligation. Crown Cork & Seal Company, Baltimore 3, Md. *World's Largest Makers of Metal Closures.*

CROWN CLOSURES

Approved by millions of housewives

"But you can't buy that kind of a motor..."

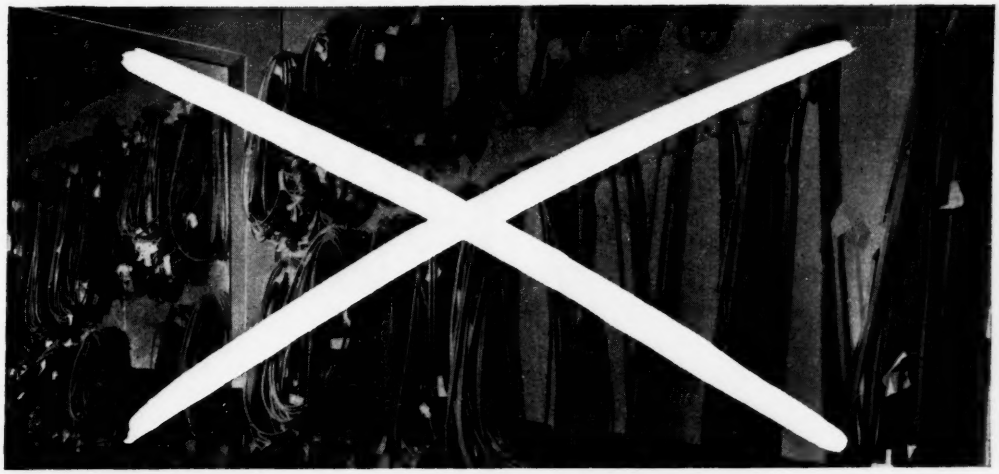
• How many times have you heard somebody that ought to know better say something like that about motors, pumps, compressors or what-have-you? And how many times have you heard somebody else say, "Oh yes you can! I saw just what we need in Blank Company's ad yesterday."

Advertising pages in this magazine are packed with *news* about your business. They contain information about products and services designed to help *you* do your job quicker, better and cheaper.

To be well-informed about the latest developments in *your* business, *your* industry . . . and to stay well-informed . . . *read all the ads too.*

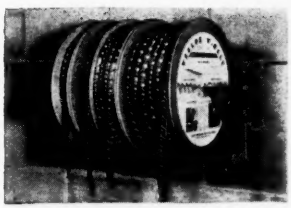
McGRAW-HILL PUBLICATIONS

HEADQUARTERS FOR INDUSTRIAL INFORMATION

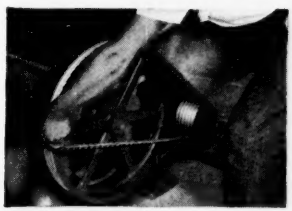


Here's how to cut your v-belt costs

You can replace up to 316 sizes of endless v-belts with just 4 reels of Veelos



From these four reels of Veelos you can make up 316 sizes of O, A, B and C section endless v-belts.



Any length belt can be coupled for quick installation on any drive in a few minutes.

Machine downtime is practically eliminated. Sliding or pivoted motor bases are not needed.

MAYBE you need belts of only one or two widths—but many different lengths—to keep all your drives producing. Then one or two reels of Veelos will give you a *complete* v-belt inventory.

You don't need to tie-up working capital in a heavy v-belt stock . . . you don't need to maintain costly inventory records. *With Veelos, you have the right size v-belt for any drive in your plant—all the time!*

Veelos on reels saves valuable storage space. It simplifies stock records; it eliminates belt deterioration and obsolescence.

Veelos is simple and easy to install. No need to dismantle drives with fixed centers or outboard bearings . . . no long, expensive interruptions to production. Just loop it around the sheave and couple the ends.

Check the advantages of Veelos and you'll agree that it can provide substantial savings for you.

VEELOS
THE LINK
V-BELT

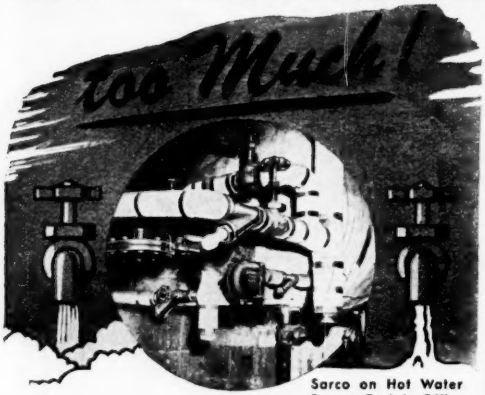
Everyone responsible for power transmission needs this Veelos data book. Gives complete engineering data, measuring and installation directions. Shows Veelos at work on scores of different drives in many different industries. Write and we'll send you a copy *free!*

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PA.

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all standard sizes, fits all standard grooves. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. Veelos is known as VEELINK outside the United States.

HOT WATER COSTS



Sarco on Hot Water Storage Tank in Office Building

WHEN IT'S TOO HOT OR TOO COLD

Hot water is a critical service, in buildings, in homes, or in industry. Poor service can be "explained" for a time. But when tenants get scalded, or workers "wait for it to warm up" because the water is too cold, things begin to happen that cost you money every day.

Sarco Blender in Apartment

TANKS

If you have a storage tank — any one of several Sarco Trap-Control combinations will insure constant tank temperatures. Sarco never overheats — therefore it saves fuel.

THE SARCO WATER BLENDER

APARTMENT

"We put in a Sarco Blender at a cost of less than a dollar per apartment — now no complaints and much less water is wasted waiting for it to get right."

INDUSTRIAL APPLICATIONS

The Sarco Water Blender is doing a good job in industry too. It insures exact temperatures at the point of use. In foods, it saves raw materials and rejected batches by having the water just right at the cooker or mixer. It is used for recirculating brine and cooling water in engines and compressors, and is the standard for wash rooms and gang showers. Bulletin No. 800.

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TEAMING UP WITH PUSHBUTTONS

for 8,000 bushels an hour—"automatically"

Stephens-Adamson's contribution to the near-magic in this mill is the pushbutton controlled REDLER Conveyor System that sends a flowing river of wheat from railroad cars into the tall storage silos. Pushbuttons control the entire operation. Even the slide gates that direct the wheat into any one of the silos are pneumatically controlled.

This system is another example of the way Stephens-Adamson engineers come up with efficient answers that simplify complicated bulk materials handling problems. With almost 50 years of continuous experience with bulk conveying problems, *plus* the S-A line that includes *every type* of conveyor unit, S-A engineers can recommend the right equipment for *your* needs—to do the most work at lowest cost-per-ton.

Write us today . . . there is no obligation.

GENERAL MILLS

LOS ANGELES, CALIFORNIA

Maximum efficiency in distributing wheat to 10 tall storage silos, with complete protection against weather and contamination, is provided by this S-A REDLER Conveyor System. Bin top floors are "open air"—no housing or elaborate supporting structure is required. The 97 foot long REDLER Conveyor has 19" wide conveying flights, and a capacity of 8000 bu. per hour. It can be operated continuously or as required. Multiple spouts and remotely controlled slide gates distribute wheat to 10 separate silos. Another REDLER Conveyor under the silos reclaims the grain as needed.

STEPHEN S-A DAMSON MFG. CO.

6 Ridgeway Avenue, Aurora, Illinois · Los Angeles, Calif. · Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

America finds a new, easy way to save

Out of the war has come one blessing—a lesson in thrift for millions of those who never before had learned to save.

Enrolled under the Payroll Savings Plan in thousands of factories, offices, and stores, over 27 million American wage earners were purchasing "E" Bonds alone at the rate of about 6 billion dollars worth a year by the time V-J Day arrived.

With War Bond Savings automatically deducted from their wages every week, thrift was "painless" to these wage earners. At the end of the war, many who never before had bank accounts could scarcely believe the savings they held.

The moral was plain to most. Here was a new, easy way to save; one as well suited to the future as to the past. Result: Today, millions of Americans are continuing to buy, through their Payroll Savings Plan, not War Bonds, but their peacetime equivalent—*U. S. Savings Bonds.*

From war to peace! War Bonds are now known as U. S. Savings Bonds, bring the same high return—$25 for every $18.75 at maturity.

Out of pay—into nest eggs! A wage earner can choose his own figure, have it deducted regularly from earnings under Payroll Savings Plan.

New homes to own! Thousands of new homes, like this, will be partially paid for through Bonds wisely accumulated during the next five to ten years.

Keeping cost of living in check! Buying only needed plentiful goods and saving the money which would bid up prices of scarce goods keeps your cost of living from rising. Save *automatically—regularly.*

Weekly Savings	SAVINGS AND INTEREST ACCUMULATED	
	In 1 Year	In 10 Years
$ 3.75	$195.00	$2,163.45
6.25	325.00	3,607.54
7.50	390.00	4,329.02
9.38	487.76	5,416.97
12.50	650.00	7,217.20
15.00	780.00	8,660.42
18.75	975.00	10,828.74

Savings chart. Plan above shows how even modest weekly savings can grow into big figures. Moral: Join your Payroll Savings Plan next payday.

SAVE THE EASY WAY...

BUY YOUR BONDS

THROUGH PAYROLL SAVINGS

Contributed by this magazine in co-operation with the Magazine Publishers of America as a public service.

You don't use *Old-Fashioned* methods of batch-mixing

CONTINUOUS PROCESSING MACHINERY IN MODERN CHEESE PLANT

CHEESE MAKING IN 1882

when you can use

MODERN CONTINUOUS PROCESSING

Why use *Old-Fashioned* spice-flavoring methods when you can use

MM&R SPICE OILS, the MODERN Method of FLAVOR CONTROL

No matter what method of processing is followed, flavoring with crude spices introduces an element of chance into your operation... for the flavoring content of crude spices changes both before use and *after* use!

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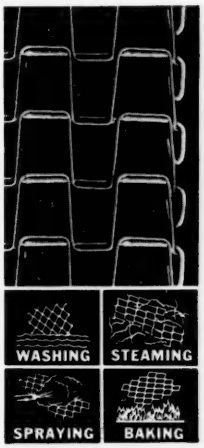

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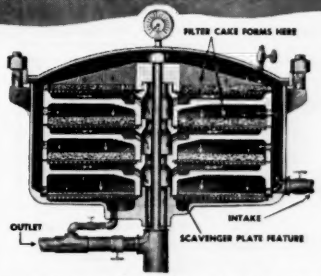

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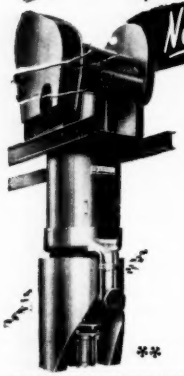

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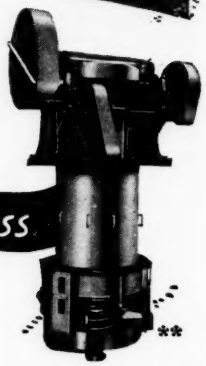

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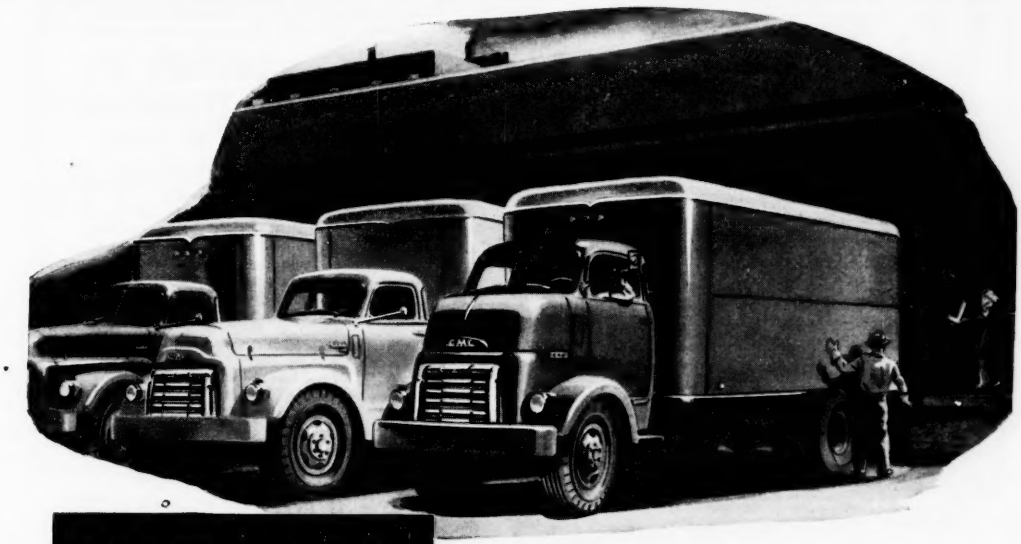

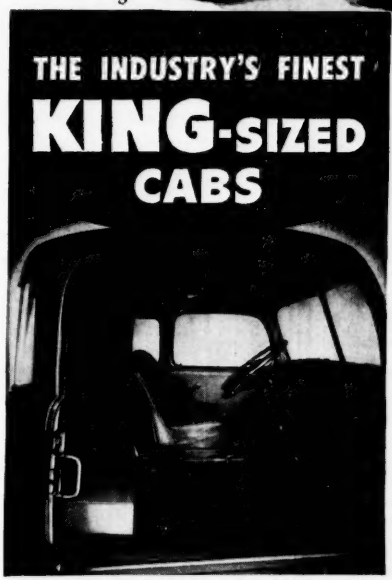

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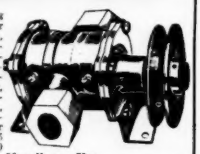

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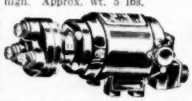

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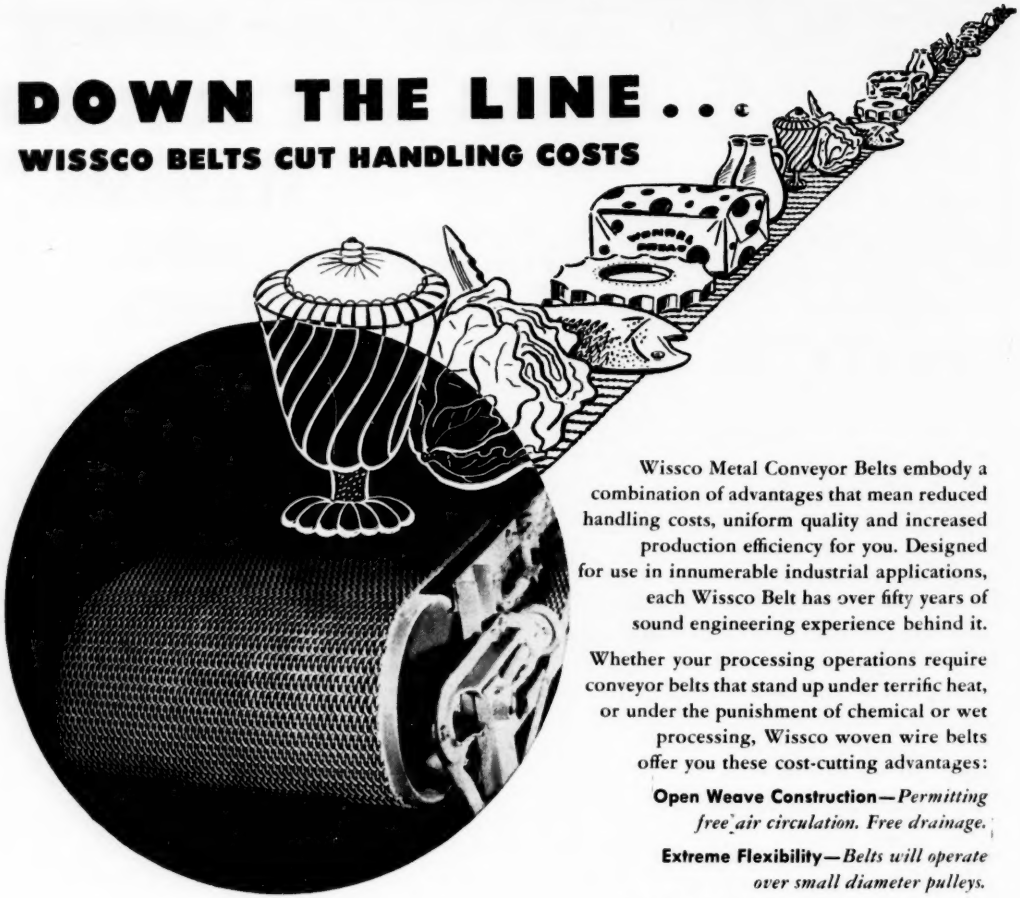

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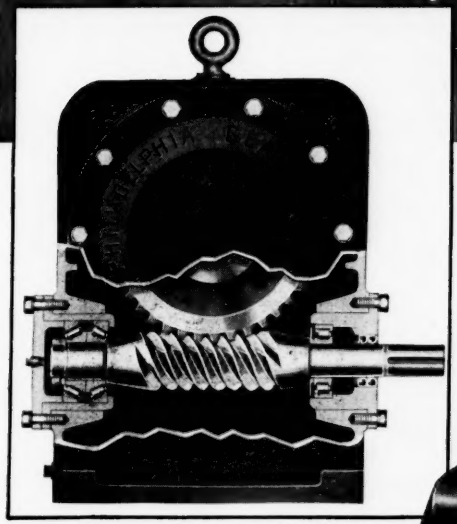

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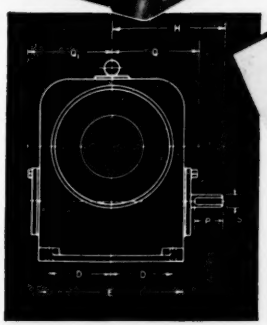

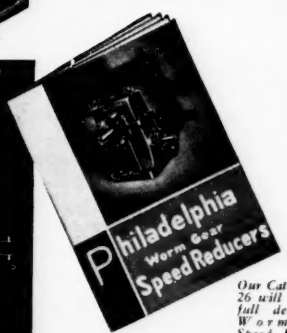

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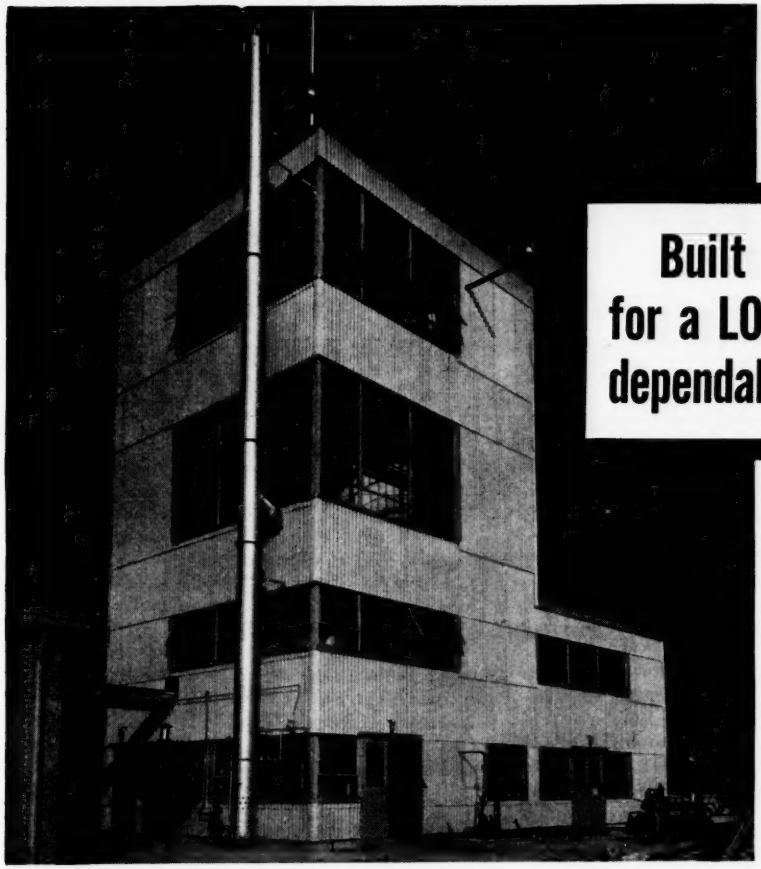
• *New pilot plant of Pittsburgh Consolidation Coal Company at Library, Pa., sided with "Century" Asbestos Corrugated. Construction by Chemical Plants Division of Blaw-Knox Company, Contractors.*



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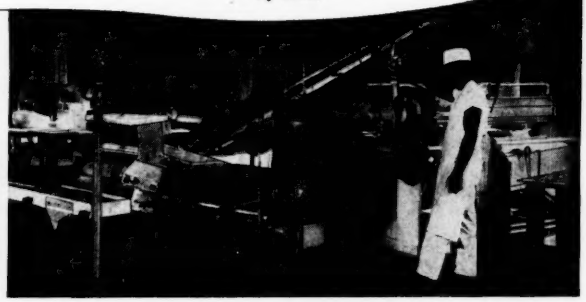

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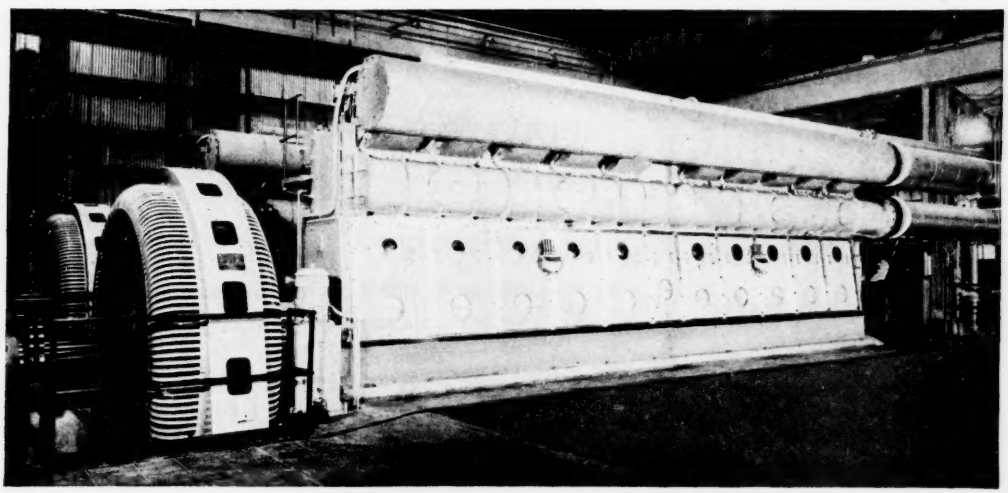

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